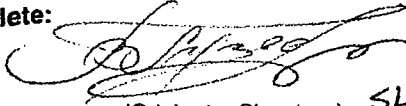
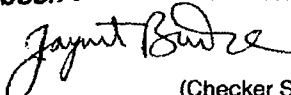
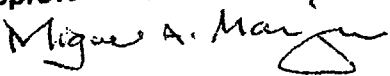


United States Nuclear Regulatory Commission
Attachment to Serial: RNP-RA/11-0067
8 Pages (including cover page)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

**NUHOMS[®] HSM-H TEMPERATURE
RISE VS. DECAY HEAT CALCULATION
NUH24PTH.0423 Revision 0**

A TRANSNUCLEAR AN AREVA COMPANY	Calculation	Calculation No.: NUH24PTH.0423 Revision No.: 0 Page: 1 of 6
DCR NO: N/A, original issue	PROJECT NAME: High Burnup NUHOMS® 24PTH System	
PROJECT NO: NUH24PTH	CLIENT: Transnuclear, Inc	
CALCULATION TITLE: NUHOMS® HSM-H Air Temperature Rise vs. Decay Heat Calculation SUMMARY DESCRIPTION: Determine the difference between the HSM-H inlet and outlet air temperature for various decay heats and ambient temperatures.		
If original issue, is licensing review per TIP 3.5 required? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (explain below) Licensing Review No.: <u>721004-300</u>		
Software Utilized: None	Version: ---	Number of CDs: None
Calculation is complete:  (Originator Signature) SLAVA GUZEYEV		<u>6/7/2005</u> (Date)
Calculation has been check for consistency, completeness and correctness:  (Checker Signature) JAYANT BUNDRE		<u>6/7/2005</u> (Date)
Calculation is approved for use:  (Project Engineer Signature) MIGUEL MANRIQUE		<u>6/27/05</u> (Date)



Calculation

Calculation No.: NUH24PTH.0423

Revision No.: 0

Page: 2 of 6

REVISION SUMMARY

REV.	DATE	DESCRIPTION	AFFECTED PAGES	AFFECTED DISCS
0	6/27/05	Initial issue	all	none

Calculation

Calculation No.: NUH24PTH.0423

Revision No.: 0

Page: 3 of 6

TABLE OF CONTENTS

	<u>Page</u>
1. Purpose.....	4
2. Assumptions	4
3. Conservatisms	4
4. Design input / data	4
5. METHODOLOGY	4
6. References.....	4
7. Results	5

LIST OF TABLES

	<u>Page</u>
Table 7-1 HSM-H Air Temperature Rise as Function of Decay Heat Load and Ambient Temperature, °F5	

LIST OF FIGURES

	<u>Page</u>
Figure 7-1 HSM-H Air Temperature Rise as Function of Decay Heat Load and Ambient Temperature ..6	



Calculation

Calculation No.: NUH24PTH.0423

Revision No.: 0

Page: 4 of 6

1. Purpose

Calculation [1] predicts an air temperature rise for airflow through the NUHOMS® HSM-H with total decay heat load of 24, 31.2, and 40.8 kW for normal and off-normal operating conditions.

Purpose of this calculation is to expand the data presented in [1] by calculating HSM-H airflow temperature rise as a function of decay heat load and ambient air temperature.

2. Assumptions

Assumptions of [1] are used in this calculation.

3. Conservatism

Conservatism of [1] are used in this calculation.

4. Design input / data

Design input and material properties listed in [1] are used in this calculation.

The HSM-H air temperature rise calculation is based upon the following ambient temperature conditions:

$T_{amb} = -40^{\circ}\text{F}, -20^{\circ}\text{F}, 0^{\circ}\text{F}, 20^{\circ}\text{F}, 40^{\circ}\text{F}, 60^{\circ}\text{F}, 70^{\circ}\text{F}, 80^{\circ}\text{F}, 90^{\circ}\text{F}, 100^{\circ}\text{F}, 110^{\circ}\text{F}, \text{ and } 117^{\circ}\text{F}.$

A total decay heat loads from $Q = 8 \text{ kW}$ to $Q = 40.8 \text{ kW}$ per DSC are considered in this calculation.

5. METHODOLOGY

The methodology described in [1] is used in this calculation.

6. References

1. Calculation, *NUHOMS® HSM-H Air Flow Calculation of HSM-H*, Transnuclear, Inc., Calculation No. NUH24PTH.0420, Revision 2.

Calculation

Calculation No.: NUH24PTH.0423

Revision No.: 0

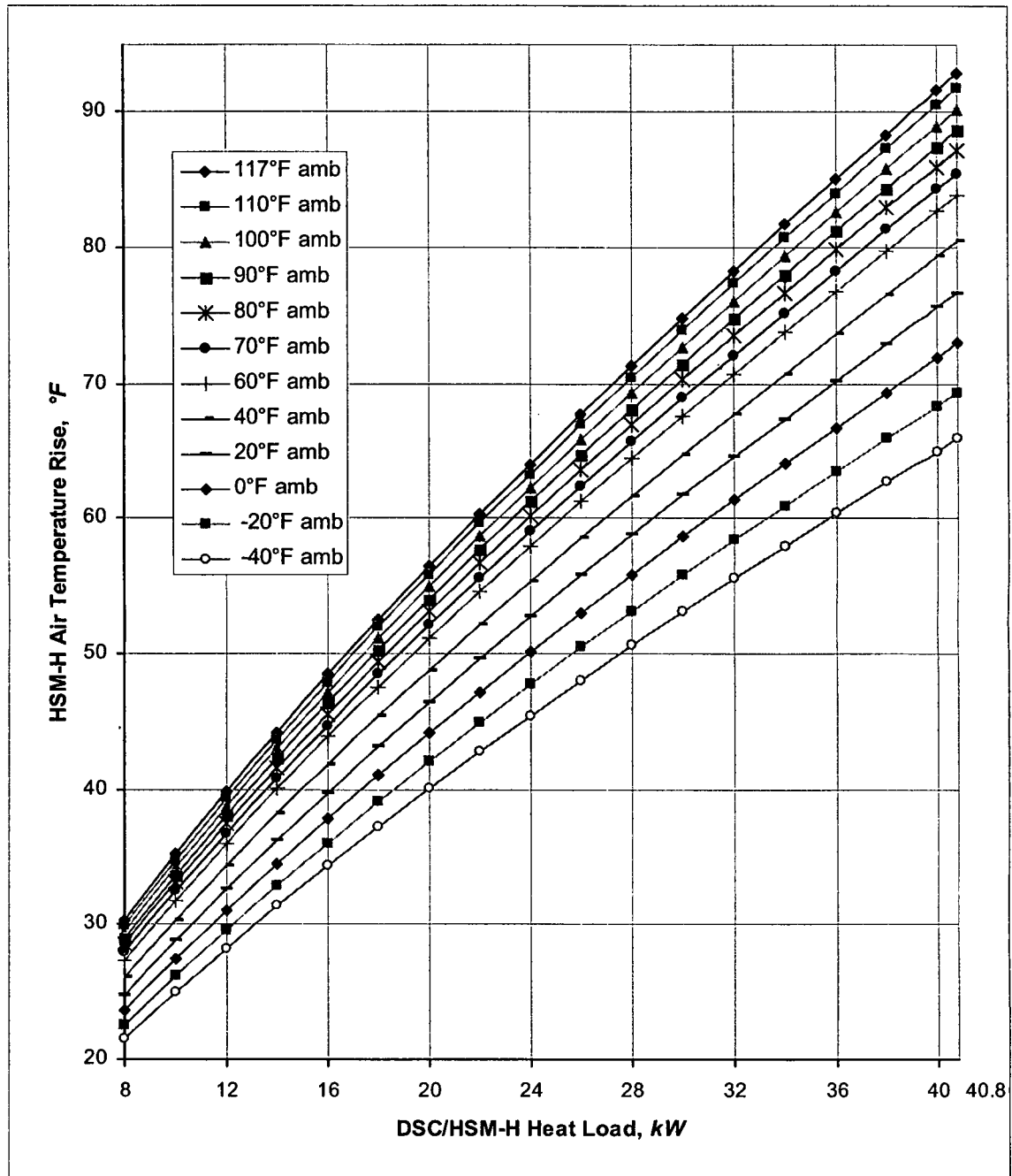
Page: 5 of 6

7. Results

The results of HSM-H air temperature rise as a function of decay heat load Q (kW/DSC) and ambient air temperature T_{amb} are listed in Table 7-1 below and shown in Figure 7-1.

**Table 7-1 HSM-H Air Temperature Rise
as Function of Decay Heat Load and Ambient Temperature, °F**

Q, kW/DSC	$T_{amb} = -40^{\circ}\text{F}$	$T_{amb} = -20^{\circ}\text{F}$	$T_{amb} = 0^{\circ}\text{F}$	$T_{amb} = 20^{\circ}\text{F}$	$T_{amb} = 40^{\circ}\text{F}$	$T_{amb} = 60^{\circ}\text{F}$	$T_{amb} = 70^{\circ}\text{F}$	$T_{amb} = 80^{\circ}\text{F}$	$T_{amb} = 90^{\circ}\text{F}$	$T_{amb} = 100^{\circ}\text{F}$	$T_{amb} = 110^{\circ}\text{F}$	$T_{amb} = 117^{\circ}\text{F}$
8	21	22	24	25	26	27	28	29	29	29	30	30
10	25	26	27	29	30	32	33	33	34	34	35	35
12	28	30	31	33	34	36	37	37	38	39	39	40
14	31	33	35	36	38	40	41	42	42	43	44	44
16	34	36	38	40	42	44	45	46	46	47	48	48
18	37	39	41	43	45	48	48	49	50	51	52	53
20	40	42	44	46	49	51	52	53	54	55	56	56
22	43	45	47	50	52	55	56	57	58	59	60	60
24	45	48	50	53	55	58	59	60	61	62	63	64
26	48	50	53	56	59	61	62	64	65	66	67	68
28	51	53	56	59	62	64	66	67	68	69	70	71
30	53	56	59	62	65	68	69	70	71	73	74	75
32	56	58	61	65	68	71	72	74	75	76	77	78
34	58	61	64	67	71	74	75	77	78	79	81	82
36	60	63	67	70	74	77	78	80	81	83	84	85
38	63	66	69	73	77	80	81	83	84	86	87	88
40	65	68	72	76	79	83	84	86	87	89	91	92
40.8	66	69	73	77	80	84	85	87	89	90	92	93



**Figure 7-1 HSM-H Air Temperature Rise
as Function of Decay Heat Load and Ambient Temperature**

ATTACHMENT 2
Sheet 1 of 1
Record of Lead Review

Document NUH24PTH.0423, NUHOMS® HSM-H Air Temperature Rise vs. Decay Heat Calculation **Revision** 0

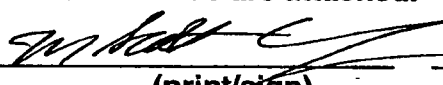
The signature below of the Lead Reviewer records that:

- the review indicated below has been performed by the Lead Reviewer;
- appropriate reviews were performed and errors/deficiencies (for all reviews performed) have been resolved and these records are included in the design package;
- the review was performed in accordance with EGR-NGGC-0003.

☐ **Design Verification Review** ☐ **Engineering Review** ☒ **Owner's Review**
☐ Design Review
☐ Alternate Calculation
☐ Qualification Testing

☐ **Special Engineering Review** _____

☒ **YES** ☐ **N/A** **Other Records are attached.**

M. S. Connelly/  Mechanical 7/21/05
Lead Reviewer **(print/sign)** **Discipline** **Date**

Item No.	Deficiency	Resolution
1	Progress Energy does not have access to another TransNuclear calculation for the assumptions, design inputs and methodology that this vendor calculation references.	Progress Energy does not need the calculation NUH24PTH.0420. The methodology used in the NUH24PTH-0423 calculation is the same as the methodology described in the NUHOMS CoC 1004 Amendment 8 SAR Section P.4.4.3. The details of the Section P.4.4.3 are presented in the generic calculation NUH24PTH-0420. The calculation NUH24PTH.0420 is available for review at the TN offices. Therefore, as long as Progress has access to the Section P.4.4.3 of the Amendment 8 SAR, it is not necessary for Progress to have Calculation NUH24PTH.0420 in their files.

FORM EGR-NGGC-0003-2-10

This form is a QA Record when completed and included with a completed design package. Owner's Reviews may be processed as stand alone QA records when Owner's Review is completed.