

10 CFR 50.55a

August 23, 2005
5928-05-20231U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001Three Mile Island, Unit 1 (TMI Unit 1)
Operating License No. DPR-50
NRC Docket No. 50-289Subject: Additional Information Regarding Kinetic Expansion Inspection and Repair Criteria
(TAC No. MB6475)

- References: 1) AmerGen Energy Company, LLC letter to NRC, dated August 11, 2005 (5928-05-20207), "Additional Information Regarding Kinetic Expansion Inspection and Repair Criteria."
- 2) AmerGen Energy Company, LLC letter to NRC, dated May 3, 2005 (5928-05-20102), "Additional Information Regarding Kinetic Expansion Inspection and Repair Criteria."

As identified in Reference 1, this letter provides additional information in response to Question No. 10 of the NRC draft request for additional information received via NRC email, dated July 12, 2005, regarding TMI Unit 1 Once-Through Steam Generator Kinetic Expansion Inspection and Repair Criteria submitted in Reference 2. The additional information is provided in Attachment 1.

If any additional information is needed, please contact David J. Distel at (610) 765-5517.

Respectfully,

Pamela B. Cowan
Director - Licensing & Regulatory Affairs
AmerGen Energy Company, LLC

Attachment: 1) NRC Question and AmerGen Response

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cc: S. J. Collins, USNRC, Administrator Region I
D. M. Kern, USNRC, Senior Resident Inspector, TMI Unit 1
P. S. Tam, USNRC, Senior Project Manager, TMI Unit 1
File No. 02077

ATTACHMENT 1

NRC Question and AmerGen Response

**Request For Additional Information
Related to TMI-1 Kinetic Expansion
Inspection and Acceptance Repair Criteria
May 3, 2005 Letter**

10. NRC Question

Provide leak rate estimates (in terms of gallons per minute), based on the licensee's PICEP leakage model, for circumferential cracks with lengths of 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, and 0.7 inches for 0.625 inch diameter, 0.034 inch thick tubes. Utilize assumptions on pressure and temperature consistent with those used to generate PICEP leak rates for axial cracks shown on Table 6 of the licensee's report ECR No. TM 01-00328, which was enclosed with the licensee's letter, dated July 13, 2001. Describe values of all other input parameters used to generate these estimates (e.g., material properties, crack tortuosity, surface roughness, etc.).

Response

EPRI's PICEP Rev. 4 (12/16/92) was used to estimate leak rates for circumferential cracks in tension with the lengths requested. These values are developed for comparative information only based on nonsafety-related, non-QA program calculations, and are not considered as design or licensing basis information. The results are provided in Table 1, below.

Pressure and temperature assumptions are consistent with Table 6 of ECR No. TM 01-00328. The analyses were performed assuming that the tubing was freespan (i.e., it was assumed that no tubesheets, tube support plates, or other conditions on the exterior of the tube affected crack openings or flows).

The analyses results were obtained using the inputs provided in Table 2. The crack opening area was calculated for a circumferential crack in tension using the method described in NUREG/CR-3464, 'The Application of Fracture Proof Design Methods Using Tearing Instability Theory to Nuclear Piping Postulating Circumferential Through-wall Cracks', dated September 1983. The methodology was used to calculate the crack opening area (COA) for circumferential through-wall cracks subjected to 1310 lbs. tension. The crack opening displacement (COD) was calculated for an elliptical opening ($4 \cdot \text{COA} / \pi L$). Table 1 provides the crack opening displacements (COD) that were calculated using the NUREG methodology as well as the PICEP generated leak rates for flow at 200°F and 600°F.

TABLE 1: PICEP ANALYSIS RESULTS

Assumed 100% TW Circ. Crack Length (in)	COD (in)	PICEP Leak Rate @ 200F (gpm)	PICEP Leak Rate @ 600F (gpm)
0.1	1.578E-04	0.0021	0.0030
0.2	3.675E-04	0.0154	0.0219
0.3	6.536E-04	0.0572	0.0812
0.4	1.044E-03	0.1490	0.2116
0.5	1.582E-03	0.3182	0.4518
0.6	2.339E-03	0.6060	0.8605
0.7	3.435E-03	1.0820	1.5364

Note: No bending at the elevation of the flaw is assumed to occur

TABLE 2: PICEP KEY INPUT PARAMETERS

PARAMETER	ANALYSIS VALUE
Cross sectional shape	Elliptical
Young's Modulus (psi)	2.9E+007
Differential Pressure (psid)	2575
Temperature (F)	600
External Pressure (psi)	14.7
Tensile Load (for COA Calc) lbf	1310
Surface Roughness (in)	2.0E-4
Number of 90 degree turns	0
Number of 45 degree turns	0
Entrance Loss Coefficient	0.61 (default)
Friction Factor	0.0 (default)
Mode (for leakage and/or COD)	1 = Leakage only
Tube diameter (inches)	0.625
Tube wall thickness (inches)	0.034