



**Entergy Nuclear Operations, Inc.**  
Pilgrim Nuclear Power Station  
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June 5, 2008

**Stephen J. Bethay**  
Director, Nuclear Assessment

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555-0001

**SUBJECT:** Entergy Nuclear Operations, Inc.  
Pilgrim Nuclear Power Station  
Docket No. 50-293  
License No. DPR-35

Pilgrim Response to NRC Request for Clarification and Commitment  
Related to HPCI Pump IST Relief Request PR-03, Rev. 3 (MD8052)

**LETTER NUMBER:** 2.08.026

**REFERENCE:**

1. Entergy Letter No. 2.08.007, Pilgrim Fourth Ten-Year In-Service Testing (IST) Program, IST Relief Request PR-03, Rev. 3, dated January 31, 2008
2. Entergy Letter No. 2.07.56, Response to NRC Request for Additional Information Related to Pilgrim In-service Testing (IST) Relief Request PR-03 (TAC NO. MD2478), dated July 12, 2007

Dear Sir or Madam:

On or about April 14, 2008, the NRC technical staff requested Entergy to confirm eight (8) statements from the revised Relief Request PR-03, Revision 3 (Reference 1) including its attachments, and licensee's RAI responses (Reference 2). Attachment 1 to this letter provides Entergy's Clarification and Commitment sought by NRC.

By Reference 1, Entergy requested relief from the ASME OMa-1996, ISTB 5.2.3 requirements for the HPCI Main Pump two vibration points; inboard and outboard bearing horizontal points P3H and P4H respectively. NRC's request for Clarification and Certification makes reference only to point P3H, with no reference to P4H. Entergy requests NRC to include both points in the approval of the relief request. The Relief Request applies to both HPCI Main Pump points. Without relief for both points, Entergy would not be able to implement the approved relief provisions.

The Clarifications and Confirmations provided in this letter fully supports Entergy proposed alternative testing to comply with ISTB 5.2.3. Additionally, the proposed alternative provides an acceptable level of quality and safety because it verifies the operational readiness of the as-built configuration of the HPCI pump, and the fact that the historical data showed no signs of degradation in the HPCI pump.

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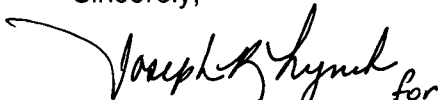
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Pilgrim intends to continue to perform the alternative comprehensive HPCI Surveillance Test as approved for the remaining during the Fourth IST interval.

This letter makes no new commitments. The confirmations included in Attachment 1 are already included in Reference 1.

If you have any questions or require additional information, please contact Mr. Joseph R. Lynch, Licensing Manager, at (508) 830-8403.

Sincerely,



Stephen J. Bethay

WGL/dal

Attachment:

1. Pilgrim Response to NRC Request for Clarification and Commitment Related to HPCI Pump IST Relief Request PR-03, Rev. 3 (MD8052) (4 pages)
2. Table: HPCI Vibration Data (1 page)

cc: Mr. James S. Kim, Project Manager  
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ATTACHMENT 1

Pilgrim Response to NRC Request for Clarification and Commitment Related to HPCI

Pump IST Relief Request PR-03, Rev. 3 (MD8052)

(4 pages)

Pilgrim Response to NRC Request for Clarification and Commitment Related to HPCI

Pump IST Relief Request PR-03, Rev. 3 (MD8052)

**References:**

- (1) Letter from Stephen J. Bethay of Entergy Nuclear Operation, Inc, to NRC, "Pilgrim Nuclear Power Station Fourth 10-year In-service Testing (IST) Program, IST Relief Request PR-03, Rev. 3" dated January 31, 2008.

**NRC REQUEST FOR CLARIFICATION**

Relief Request page 4 of 8, first paragraph refers to Attachment 4 (see Item 5 below), whereas the licensee submittal does not contain Attachment 4.

**ENTERGY RESPONSE**

There was no Attachment 4, this is a typographical error, the correct attachment is "Attachment 3, Contractor Report, Independent Assessment of Pilgrim High Pressure Coolant Injection Pump Vibration and Performance", dated January, 2008 (14 pages)".

**NRC REQUEST FOR ENTERGY'S CONFIRMATION**

Based on the revised Relief Request PR-03, Revision 3 including its attachments, and licensee's RAI responses, NRC staff would like to confirm the following:

**NRC ITEM 1**

Quarterly pump and valve operability tests will be performed to ensure the HPCI pump and turbine function for the intended safety function.

**ENTERGY CONFIRMATION**

Entergy confirms that Quarterly pump and valve operability tests will be performed to ensure the HPCI pump and turbine function for the intended safety function.

**NRC ITEM 2**

Quarterly lubrication oil sampling and periodic laboratory analysis as appropriate for the pressure-fed bearings on the Turbine, Main pump, and Gear Reducer and once/cycle (2 years) sampling and analysis for the non-pressure fed Booster pump will be performed. **Lubrication oil analysis** currently performed includes viscosity, acidity, residue, water content, metals by A.E. spectrometry, and ferrogram readings. This type of monitoring will detect degradation of the turbine or pump bearings due to accelerated wear, fretting, surface fatigue, or oil contamination. **(Please provide frequency of the Lubrication analysis currently performed)**

**ENTERGY CONFIRMATION**

- Quarterly lubrication oil sampling analysis will be performed. This includes analysis for viscosity, water content, chemical changes, and contaminants including ferrous particles.
- Once/cycle (i.e., once/2 years) laboratory analysis of the lubrication oil for the pressure-fed bearings on the Turbine, Main pump, and Gear Reducer will be performed. The Laboratory reviews include but not limited to particle wear analysis, acid number readings, analytical ferrogram and oxidation stability. This type of monitoring will detect degradation of the turbine or pump bearings due to accelerated wear, fretting, surface fatigue, or oil contamination.
- Once/cycle oil sampling analysis on the non-pressure fed Booster pump bearing sump will be performed.

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**NRC ITEM 3**

HPCI pump and Turbine lube oil system is serviced as-needed weekly. HPCI gland seal condenser hot well pump and motor bearings and HPCI auxiliary lube oil pump and motor bearings are serviced semiannually for lubrication.

**ENTERGY CONFIRMATION**

Entergy confirms that HPCI pump and Turbine lube oil system is serviced as-needed weekly. The weekly lube oil system 'servicing' consists of observing turbine/pump oil sump level, performing a visual check to verify oil condition, and monitoring for oil system leakage. During this surveillance the oil is visually observed for discoloration, emulsification, and foaming. Observed oil system abnormalities are reported, and corrective action initiated. The HPCI gland seal condenser hot well pump and motor bearings and HPCI auxiliary lube oil pump and motor bearings are serviced semiannually for lubrication.

**NRC ITEM 4**

HPCI Turbine/Main pump, Main pump/Reducer, and Reducer/Booster pump gear type shaft couplings are cleaned, examined, and grease-lubricated every 2 years. These examinations detect excessive wear, fretting, heating, or fatigue due to any unusual loading conditions.

**ENTERGY CONFIRMATION**

Entergy confirms that HPCI Turbine/Main pump, Main pump/Reducer, and Reducer/Booster pump gear type shaft couplings are cleaned, examined, and grease-lubricated every 2 years. These examinations detect excessive wear, fretting, heating, or fatigue due to any unusual loading conditions.

**NRC ITEM 5**

Past monitoring and maintenance activities have shown no evidence or observations of the degradation in the HPCI Turbine, Main pump, Gear Reducer, or Booster Pump. The HPCI and Booster pump historical vibration spectrum (**Attachment 4**) supports this conclusion. Thus, the continuation of the above periodic monitoring and maintenance activities will ensure that the HPCI pump remains in a high level of operational readiness and that degradation of HPCI pump mechanical condition, reliability or performance will be detected and corrected in a timely manner.

**ENTERGY CONFIRMATION**

Entergy confirms item 5 statement, except that Attachment 4 shall be read as Attachment 3, as provided in the clarification at the beginning of this Attachment.

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**NRC ITEM 6**

Vibration monitoring (part of comprehensive testing) shall be performed once/year in lieu of the Code requirement of once/2 years. Further, as HPCI pump vibration will normally exceed the OM limiting Alert Range of  $>0.325$  in/sec, the once/year frequency will be doubled to twice/year.

**ENTERGY CONFIRMATION**

Entergy confirms that vibration monitoring will be performed twice/year as the commitment frequency for this relief request, even when the HPCI pump is below the modified Alert Ranges. The modified Alert levels have been applied to both the Main and Booster Pump vibration points where the normal vibration level has been historically at or above the value of 0.325 in/sec (some points have readings above and below the 0.325 in/sec value due to their normal variation). For the Main Pump, this includes all points P3H, P3V, P3A, P4H, while P4V remains consistently below 0.325 in/sec, and for the Booster Pump, this includes P7H, P7V, P8H, P8V, while P3A remains consistently below 0.325 in/sec. These Alert levels are being changed to new values so that the HPCI Pump is not continually in Alert such that any significant change to the vibration level will be highlighted by a corresponding change in status. The "absolute value" Alert levels (given as in/sec velocity) have been modified to higher values, but the "relative value" Alert levels (given as multiples of the Reference Value  $V_r$ ) for the same points have been reduced from the OM Code value of  $2.5V_r$  down to  $1.5V_r$ . This was done so that the relative value Alert levels will be consistent with the absolute values, which tend to fall between  $1.25V_r$  and  $1.5V_r$ .

**NRC ITEM 7**

As an administrative practice, Pilgrim will monitor vibration of the HPCI pump during each of the Quarterly Group B test, whenever practicable, and preventive or corrective maintenance will be implemented as necessary to prevent failure.

**ENTERGY CONFIRMATION**

The statement "Pilgrim will monitor vibration of the HPCI pump during each of the Quarterly Group B test" is not a commitment of frequency for vibration monitoring under the ISTB requirement every quarter. Instead, it is Entergy's current administrative practice to ensure pump vibration is monitored on a quarterly basis while performing the Group B test. This approach is conservative and provides added confidence to monitor pump performance for its intended safety function.

**NRC ITEM 8**

Full spectrum analysis will be performed for all IST vibration points once/year while performing comprehensive pump test. As mentioned in Item 6 above, if frequency is doubled, the spectrum analysis will be performed twice/year.

**ENTERGY CONFIRMATION**

The performance of spectral analysis twice/year is the vibration monitoring commitment frequency for this relief request. However, as an administrative practice (as stated in item 7), Pilgrim will monitor vibration of the HPCI pump during each of the Quarterly Group B tests, whenever practicable.

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**NRC NOTE**

Please note that NRC staff is not in a position to accept and agree with the Pilgrim and the Mancini Consulting Service approach of filtering the peak vibration from the HPCI pump spectrum to lower the overall HPCI pump vibration. The OM Code paragraph ISTB-5123(d) clearly states that vibration measurements are to be broad band (unfiltered). However, peak vibration value greater than 0.7 in/sec only at one point (P3H), along with other vibration values which are less than 0.7 in/sec (as mentioned in relief request) may be acceptable with additional vibration monitoring, spectrum analysis, history of vibration values, and maintenance history of the HPCI pumps etc. During IST testing, if the measured vibration values (except P3H) exceed the value of 0.7 in/sec, corrective action is required.

**ENTERGY RESPONSE**

Pilgrim confirms that during IST testing, if the measured vibration values (except P3H and P4H) exceed the value of 0.7 in/sec, corrective action is required. The HPCI surveillance procedure acceptance criterion implements this OM Code requirement. In addition, if the measured vibration values for P3H and P4H, with the relief request described discreet peak (at exactly 4x booster pump RPM) extracted from the overall bearing vibration value, exceed the value of 0.7 in/sec, corrective action is required.

Presently P4H does not exceed the 0.7 in/sec acceptance criterion. However, during the past two and half years the observed reading has fallen between 0.5 in/sec and 0.7 in/sec. Because the normal vibration amplitude is at the OM Code limit of 0.7 in/sec, relief for P4H is also needed.

Attached Table provides tabulated vibration results for P3H and P4H points. These results indicate the range of vibration amplitudes observed since 1994.

Entergy has explained in Reference 1, Attachment 1, RAI Question 1 Response that NRC accepted independent consultant's reports in granting past precedents. The Pilgrim request follows NRC approved precedents discussed therein. Specifically, the Pilgrim request follows the NRC approved Monticello (TAC No. MB6807) precedent discussed by the NRC in its SER on Monticello item 3.3.5 on pages 8 and 9. Entergy hereby requests that NRC staff consider Pilgrim relief request for approval in accordance with the established NRC precedents for Monticello, Cooper, Fermi-2, Calvert Cliff, and Seabrook with their respective contractor reports.

The Clarifications and Confirmations provided in this letter fully supports Entergy proposed alternative testing to comply with ISTB 5.2.3 and the proposed alternative provides an acceptable level of quality and safety because it verifies the operational readiness of the as-built configuration of the HPCI pump, and the historical data has shown no signs of degradation in HPCI pump performance.

Table: HPCI Vibration Data.xls

(1 Page) Attached



## HPCI TURBINE PUMP P-205 INTEGRAL - MAIN & BOOSTER PUMP

			Vr X 1.5 - Vib Alert Values				0.530	0.562		0.325	0.515	0.372	0.531	0.572	0.325	0.617	0.669			
			PR-03 Vib Alert Values				0.450	0.500		0.375	0.450	0.400	0.500	0.500	0.325	0.550	0.600			
Reference	4000		4250	1250		0.9695	0.3533	0.3748	0.6388	0.1844	0.343	0.2481	0.3541	0.3812	0.1675	0.4115	0.4463	Reference Values		
	M&TE	TEST				As Collected Velocity Vibration										Velocity with Discrete Peak Extracted				
DATE	SPEED	TYPE	FLOW	DELTA P		P3H	P3V	P3A	P4H	P4V	P7H	P7V	P8H	P8V	P8A	P3H	P4H	NOTES		
5/20/2008	3975	Q	4250	1212		0.931	0.281	0.406	0.617	0.161	0.335	0.248	0.417	0.345	0.162	0.440	0.480			
2/21/2008	4025	Q	4250	1238		0.726	0.338	0.363	0.596	0.178	0.307	0.335	0.372	0.332	0.159	0.433	0.495			
11/20/2007	4000	Q	4250	1221		0.793	0.316	0.366	0.576	0.150	0.326	0.256	0.409	0.353	0.162	0.433	0.486			
8/21/2007	3978	Q	4250	1196		1.057	0.278	0.402	0.688	0.151	0.341	0.258	0.420	0.342	0.161	0.469	0.507			
5/9/2007	3987	Bi-Comp	4250	1211		0.795	0.314	0.357	0.592	0.153	0.307	0.275	0.401	0.305	0.152	0.464	0.516	RFO-16 PMT - Coupling Work/Lube		
2/21/2007	3969	Q	4250	1200		0.776	0.321	0.384	0.538	0.140	0.303	0.211	0.368	0.323	0.153	0.399	0.456	Valve PMT - MR 05106922		
11/20/2006	3996	Q	4250	1218		0.850	0.312	0.368	0.593	0.143	0.345	0.273	0.376	0.352	0.165	0.384	0.451	Some Vibs taken locally		
8/21/2006	3976	Q	4250	1202		1.053	0.292	0.410	0.676	0.166	0.354	0.237	0.392	0.350	0.162	0.428	0.444			
5/23/2006	3975	Q	4250	1203		0.960	0.307	0.432	0.645	0.162	0.337	0.249	0.410	0.354	0.167	0.421	0.473			
2/24/2006	4037	Q	4250	1252		0.682	0.327	0.383	0.661	0.167	0.319	0.249	0.345	0.323	0.169	0.471	0.472	1) Rev 100 First Q Test, 2) P3H was taken Locally		
11/23/2005	4000	Bi-Comp	4250	1201		0.815	0.327	0.374	0.559	0.155	0.333	0.240	0.367	0.352	0.173	0.407	0.442	Rev 100 First Bi-Comp Test		
8/26/2005	4000	IWP - Q	4250	1231		0.829	0.294		0.559		0.323	0.296								
5/25/2005	4000	IWP - Q	4275	1257		0.969	0.354		0.611		0.347	0.253								
2/23/2005	4000	IWP - Q	4260	1232		0.703	0.241		0.640		0.223	0.193								
11/24/2004	3950	IWP - Q	4250	1213		0.798	0.309		0.626		0.298	0.302								
8/24/2004	4000	IWP - Q	4250	1211		0.939	0.286		0.675		0.328	0.249								
5/25/2004	4000	IWP - Q	4270	1250		0.750	0.311		0.648		0.312	0.283								