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**Fred Dacimo**  
Site Vice President  
Administration

May 23, 2007

Re: Indian Point Unit No. 3  
Docket No. 50-286

NL-07-061

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

**SUBJECT: Supplemental Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2 for Indian Point Nuclear Generating Unit No. 3 (TAC No. MD2671)**

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**REFERENCES:**

1. Entergy letter dated July 24, 2006, F.R. Dacimo to Document Control Desk, "Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2"
2. NRC letter dated March 15, 2007, J.P. Boska to M.R. Kansler, "Indian Point Nuclear Generating Unit No. 3 - Request for Additional Information Regarding the Revision of Existing Exemptions from Title 10 of the Code of Federal Regulations Part 50, Appendix R Requirements (TAC No. MD2671)"
3. Entergy letter dated April 30, 2007, F.R. Dacimo to Document Control Desk, "Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2 for Indian Point Nuclear Generating Unit No. 3"

Dear Sir or Madam:

By letter dated July 24, 2006 (Reference 1), Entergy Nuclear Operations, Inc. submitted a request for the revision of existing exemptions from the requirements of 10 CFR 50, Appendix R for one-hour Hemyc Electrical raceway fire barrier systems located in Fire Areas ETN-4 and PAB-2. The NRC staff requested additional information by letter dated March 15, 2007

ADD

(Reference 2) in order to complete its review of the exemption request. Responses to questions 2 through 6 were provided by letter dated April 30, 2007 (Reference 3). The purpose of this letter is to provide the response to question 1, contained in Attachment 1, which was scheduled for submission by May 31, 2007 as indicated in Reference 3.

Commitments made in this letter are identified in Attachment 2. If you have any questions or require additional information, please contact Mr. T.R. Jones, Manager, Licensing at (914) 734-6670.

I declare under penalty of perjury that the foregoing is true and correct. Executed on

May 23, 2007 .

Sincerely,

A handwritten signature in black ink, appearing to read 'Fred R. Dacimo', with a stylized flourish at the end.

Fred R. Dacimo  
Site Vice President  
Indian Point Energy Center

Attachments:

- 1: Supplemental Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2
- 2: Commitments made in Supplemental Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

cc: Mr. John P. Boska, Senior Project Manager, NRC NRR DORL  
Mr. Samuel J. Collins, Regional Administrator, NRC Region 1  
NRC Resident Inspector, IPEC  
Mr. Peter R. Smith, President, NYSERDA  
Mr. Paul Eddy, New York State Dept. of Public Service

ATTACHMENT 1 to NL-07-061

**Supplemental Response to Request for Additional Information Regarding the Request for  
Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc  
Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2**

ENTERGY NUCLEAR OPERATIONS, INC.  
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3  
DOCKET NO. 50-286

**Supplemental Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2**

The response to the first question contained in the NRC letter dated March 15, 2007, "Request for Additional Information Regarding the Revision of Existing Exemptions from Title 10 of the Code of Federal Regulations Part 50, Appendix R Requirements (TAC No. MD2671)," is as follows:

1. ***Which specific NRC-tested configurations were the IP3 modified Hemyc ERFBS configurations compared to?***

Response

The IP3 Hemyc Electrical Raceway Fire Barrier System (ERFBS) configurations were compared to the size, orientation, materials, method of construction, and thermal performance of Configurations 1A and 1I in NRC Test 1, and Configurations 2B, 2D and 2G in NRC Test 2. Below is a summary of those comparisons.

**Conduits**

The protected 4" conduits, each with a cable percent fill of approximately 30% and protected with direct-attached 2" thick Hemyc blanket wrap, were compared to Configuration 1A in NRC Test 1. Configuration 1A was a 4" conduit with 0% cable fill and protected with direct-attached 2" thick blanket wrap. Configuration 1A provided at least 30 minutes of thermal protection.

**Cable Tray Sections**

The protected 18" cable tray sections (with a cable percent fill ranging from approximately 10% to 25%) and 24" cable tray sections (each with a cable percent fill of approximately 50%), each protected with 1-1/2" thick Hemyc blanket wrap with a nominal 2" air gap between the protected cable tray and the blanket, were compared to Configurations 2B and 2D in NRC Test 2. Configuration 2B was a 12" cable tray protected with 1-1/2" thick blanket wrap with a nominal 2" air gap. Configuration 2D was a 36" cable tray protected with 1-1/2" thick blanket wrap with a nominal 2" air gap. Both cable trays had a cable percent fill of 0%.

Configuration 2B provided at least 30 minutes of thermal protection. Configuration 2D exceeded the temperature rise acceptance criteria at just under 30 minutes into the exposure period; at 27 minutes, thermocouples on the #8 bare copper conductor exceeded the allowable temperature rise. The thermocouples reporting the elevated temperatures were in the vicinity of, and appear to be largely attributed to, an opening

which developed on the inside radius of the 90 degree sweeping bend. Based on our review of the test results, we believe that inadequately retained blanket wrap at the opening permitted infiltration of hot gases into the ERFBS. No apparent structural failure of the ERFBS was observed at the 90 degree sweeping bend, as illustrated by the thermocouple data.

The IP3 design is similar to Configuration 2D in that no stainless steel over-banding is used to help retain the Hemyc blanket wrap in place. However, given that the apparent failure mechanism of Configuration 2D was separation at a joint, the installation of over-banding would provide for enhanced performance by retaining the Hemyc blanket wrap in place, thereby minimizing the potential for joint separation. In light of these test results, Entergy will install additional over-banding on protected cable tray sections. This letter clarifies the commitment contained in Reference 1 (installation of additional protection of the electrical raceway supports and certain metallic penetrating items) to explicitly include installation of over-banding, as indicated would be done in Reference 4.

#### Box-Type Enclosures

The protected box-type enclosure, protected with direct-attached 2" thick Hemyc blanket wrap, was compared to Configuration 2G in NRC Test 2. The box-type enclosure consists of a steel box measuring approximately 24"w x 40"h x 18"d and a unistrut frame at a containment penetration adjacent to the box, measuring approximately 50"w x 30"h x 20"d. The overall enclosure measures approximately 74"w x 40"h x 20"d. Configuration 2G was an 18" x 24" x 8" junction box protected with direct-attached 2" thick blanket wrap.

Configuration 2G provided at least 30 minutes of thermal protection. The current IP3 design does not use stainless steel over-banding as did tested Configuration 2G. A review of Configuration 1I in NRC Test 1 was also performed to evaluate the over-banding. Configuration 1I was an 18" x 24" x 8" junction box protected with direct-attached 2" thick blanket wrap, which did not use stainless steel over-banding. The thermal data indicates to us that joint failure on Configuration 1I began about 15 minutes into the exposure fire in comparison to Configuration 2G, which provided at least 30 minutes of thermal protection. To more closely reflect Configuration 2G and to address the apparent failure mechanism observed for Configuration 1I, Entergy will install over-banding on the protected box-type enclosure, consistent with our commitment discussed above, to provide for enhanced performance by retaining the Hemyc blanket wrap in place, thereby minimizing the potential for joint separation.

It was noted in our review that Configuration 2G was fully exposed to the furnace, whereas the IP3 design is a five-sided configuration, with the sixth side being formed by the containment wall, and that the IP3 design employs an overlap on the wall securely fastened to the concrete with continuous steel bar and expansion anchors versus single-point connections used in the typical design. These design differences are judged to improve the performance of the IP3 configuration over the performance of the tested configurations in the event of a fire.

As summarized above and documented in Entergy Engineering Report IP-RPT-06-00062, it is concluded that the IP3 Hemyc ERFBS configurations, contingent on the installation of stainless steel over-banding as described above, the implementation of enhanced support protection, and the protection of certain metallic penetrating items, will provide at least 30 minutes of thermal protection.

***Are the modified configurations comparable to the industry-sponsored Hemyc test configurations? Do the results of the industry-sponsored Hemyc tests also support the licensee's conclusion on the 30-minute rating of the modified Hemyc ERFBS at IP3?***

#### Response

##### Industry-Sponsored Hemyc Testing

The initial industry-sponsored Hemyc testing (Reference 2) included six conduits protected by direct-attached 2" thick blanket wrap. The blanket wrap and construction methods used in the test were sufficiently comparable to those used in the design and installation of the IP3 Hemyc ERFBS configurations to support our conclusion on the 30-minute rating of the modified Hemyc ERFBS at IP3.

Of the six conduit configurations tested, there were two 4" conduit configurations, two 2-1/2" conduit configurations, and two 1" conduit configurations. The two 4" conduit configurations (Configurations 1A and 1B) are comparable to the IP3 Hemyc ERFBS conduit configurations and Configuration 1A in NRC Test 1. The industry-sponsored test results are comparable to those obtained for Configuration 1A in NRC Test 1, in that the two 4" conduit configurations provided at least 30 minutes of thermal protection. These results support our conclusion on the 30-minute rating of the modified Hemyc ERFBS at IP3.

##### Other Hemyc Testing

More recently completed Hemyc testing (Reference 3) performed subsequent to the NRC and industry-sponsored testing, included two single 24" cable tray sections and one configuration of multiple 24" cable tray sections each protected with 1-1/2" thick blanket wrap with a nominal 2" air gap, three 1-1/2" conduits protected with direct-attached 2" thick blanket wrap, and a 12" x 12" x 6" junction box protected with direct-attached 2" thick blanket wrap. The blanket wrap and construction methods used in the test were sufficiently comparable to those used in the design and installation of the IP3 Hemyc ERFBS configurations to support our conclusion on the 30-minute rating of the modified Hemyc ERFBS at IP3.

The results of the tested cable tray configurations are comparable to those obtained for Configurations 2B and 2D in NRC Test 2, and support our conclusion on the 30-minute rating of the modified Hemyc ERFBS at IP3. One of the two single 24" cable tray configurations (Configuration A-3) and the multiple 24" cable tray configuration (Configuration A-2) provided at least 30 minutes of thermal protection. The remaining single 24" cable tray configuration (Configuration A-1) exceeded the temperature rise acceptance criteria at just under 30 minutes into the fire exposure; at 24 minutes, the average thermocouple temperature on the #8 bare copper conductor exceeded the allowable temperature rise. Similar to Configuration 2D in NRC Test 2, no stainless steel over-banding was used on Configuration A-1 to help retain the Hemyc blanket wrap in place. No apparent structural failure of the Configuration A-1 was observed, as illustrated by the thermocouple data and post-test examination. However, the post-test examination did identify significant shrinkage of blanket wrap underneath joint overlaps which we postulate may have contributed to the infiltration of hot gases into the cable tray ERFBS. As noted above, to help mitigate the apparent infiltration of hot gases, Entergy will install over-banding on the protected cable tray sections to provide for enhanced performance by retaining the Hemyc blanket wrap in place, thereby minimizing the potential for joint separation.

Additionally, the results of the test of the junction box configuration (Configuration A-7) support our conclusion on the 30-minute rating of the modified Hemyc ERFBS box-type configuration at IP3. The junction box configuration is similar to the IP3 Hemyc ERFBS box-type configuration, in that both are five-sided configurations, with the sixth side being formed by a reinforced concrete wall. The tested junction box configuration provided at least 30 minutes of thermal protection. Although the tested junction box performed satisfactorily without the use of stainless steel over-banding, to more closely reflect Configuration 2G in NRC Test 2 and to address the apparent failure mechanism observed for Configuration 1I in NRC Test 1, Entergy will install over-banding on the protected box-type enclosure to help retain the Hemyc blanket wrap in place, thereby minimizing the potential for joint separation.

References:

1. Entergy letter dated June 8, 2006, F.R. Dacimo to Document Control Desk, "Response to Generic Letter 2006-03, Potentially Nonconforming Hemyc and MT Fire Barrier Configurations"
2. Hemyc (1-Hour) Electrical Raceway Fire Barrier Systems Performance Testing; Conduits (Intertek Testing Services NA, Inc. Fire Test Report, Project No. 14980-3080808, dated October 17, 2005)
3. Report of Testing Hemyc 1-Hour ERFBS for Compliance with the Applicable Requirements of the Following Criteria: Generic Letter 86-10, Supplement 1 (Intertek Testing Services NA, Inc. Fire Test Report No. 3106846, dated January 16, 2007, Revised February 5, 2007)
4. Entergy letter dated July 24, 2006, F.R. Dacimo to Document Control Desk, "Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2"



ATTACHMENT 2 to NL-07-061

**Commitments made in Supplemental Response to Request for Additional  
Information Regarding the Request for Revision of Existing Exemptions from 10  
CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System,  
Fire Areas ETN-4 and PAB-2**

ENTERGY NUCLEAR OPERATIONS, INC  
INDIAN POINT NUCLEAR GENERATING UNIT 3  
DOCKET NO. 50-286

This table identifies actions discussed in this letter for which Entergy commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are not commitments.

Number	Commitment	Type	Scheduled Completion Date
3	<p>Complete modification (including supporting engineering evaluation) to install stainless steel over-banding (as described), additional protection of the electrical raceway supports, and protection of certain metallic penetrating items, associated with the existing Hemyc ERFBS located outside containment at Indian Point 3</p> <p>[This is a clarification of commitment 3 (licensee reference number COM-07-00034) made in Entergy Letter NL-06-060 dated June 8, 2006]</p>	One-Time Action	12/01/2008