



Entergy Nuclear Northeast
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249
Tel 914 734 6700

Fred Dacimo
Site Vice President
Administration

July 24, 2006

Re: Indian Point Unit No. 3
Docket No. 50-286
NL-06-078

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

SUBJECT: 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

- References:
- 1) NRC Information Notice 2005-07, "Results of HEMYC Electrical Raceway Fire Barrier System Full Scale Fire Testing," April 1, 2005
 - 2) NYPA Letter, J. C. Brons to S. A. Varga (NRC), "Appendix R Fire Protection Program," August 16, 1984
 - 3) NYPA Letter, J. C. Brons to S. A. Varga (NRC), "Information to Support the Evaluation of IP3 to 10 CFR 50.48 and Appendix R to 10 CFR 50," September 19, 1985
 - 4) NRC Letter and SER, S. A. Varga to J. C. Brons (NYPA), "Indian Point 3 Nuclear Power Plant - Exemption From Certain Requirements of Section III.G and III.J of Appendix R to 10 CFR Part 50," January 7, 1987
 - 5) IPEC Letter NL-06-060, F. Dacimo to Document Control Desk, "Response to Generic Letter 2006-03 (Potentially Nonconforming Hemyc and MT Fire Barrier Configurations)," June 8, 2006

Dear Sir or Madam:

NRC Information Notice (IN) 2005-07 (Reference 1) notified licensees of potential performance concerns associated with the one-hour rated Hemyc electrical raceway fire barrier system (ERFBS), indicating that the system may be incapable of fulfilling the stated one-hour fire resistance rating when tested in accordance with Generic Letter 86-10, Supplement 1 criteria. Indian Point Unit No. 3 (IP3) utilizes the one-hour rated Hemyc

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ERFBS that is the subject of IN 2005-07 in two areas of the plant. In a Safety Evaluation Report (SER) dated January 7, 1987 (Reference 4), the Staff granted a number of exemptions from specific requirements of 10 CFR 50, Appendix R, which included these two plant areas. Entergy has reviewed the Hemyc fire test results provided by the NRC in IN 2005-07 and has determined that it is necessary to revise the fire resistance rating of the Hemyc ERFBS configurations credited in two of the exemptions. The two affected exemptions are those applicable to Fire Area PAB-2 in the Primary Auxiliary Building, and Fire Area ETN-4 in the Electrical Tunnels and Electrical Penetration Areas.

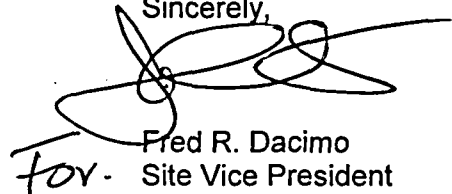
In accordance with 10 CFR 50.12, the purpose of this letter is to request revision of the January 7, 1987 SER to reflect that the installed Hemyc ERFBS configurations provide a 30-minute fire resistance rating, in lieu of the previously stated one-hour fire resistance rating. The requests for the exemptions granted by the January 7, 1987 SER were docketed in NYPA Letters dated August 16, 1984 (Reference 2) and September 19, 1985 (Reference 3). Based on a review of these letters and of the NRC test results, it is Entergy's position that a Hemyc ERFBS fire resistance rating of 30 minutes will provide sufficient protection for the affected raceways, with adequate margin, to continue to meet the intent of the original requests for exemption and the conclusions presented in the January 7, 1987 SER. This evaluation is summarized in Attachment 1.

As documented in Attachment 1, it is Entergy's conclusion that the revised fire resistance rating of the Hemyc ERFBS does not reflect a reduction in overall fire safety, and presents *no added challenge to the credited post-fire safe-shutdown capability. The remainder of the credited fire protection features, the fire hazards and ignition sources, fire brigade and operator response to fire events, and the credited post-fire safe-shutdown capability remain materially unchanged from the configuration as originally described in the NYPA letters and as credited in the January 7, 1987 SER.*

Entergy has reviewed the as-built configurations of the Hemyc ERFBS installed at IP3 against the results of the NRC Hemyc fire test program as referenced by IN 2005-07. This review has determined that the installed ERFBS can be expected to afford a thermal protection rating of at least 30 minutes, contingent upon the installation of a modification to augment raceway support protection and to install over-banding of certain enclosures. A commitment to install these modifications is contained in our response to Generic Letter 2006-03 (Reference 5). The conclusions from the engineering evaluation are also summarized in Attachment 1.

There are no new commitments contained in this letter. If you have any questions or require additional information, please contact Mr. Patric W. Conroy at 914-734-6668.

Sincerely,



Fred R. Dacimo
Site Vice President
Indian Point Energy Center

Attachment 1: 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. Samuel J. Collins, Regional Administrator, NRC Region I
Mr. John P. Boska, Senior Project Manager, NRC NRR DORL
NRC Resident Inspectors Office, Indian Point Energy Center
Mr. Paul Eddy, New York State Department of Public Service
Mr. Peter R. Smith, NYSERDA

ATTACHMENT 1 to NL-06-078

**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

**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**

1.0 INTRODUCTION

The Indian Point Unit No. 3 (IP3) electrical raceways provided with Hemyc ERFBS protection consist of several conduits, cable trays, and a box-type enclosure. The locations of the Hemyc ERFBS installations are illustrated by Figures 1 through 4.

To support the request for revision to the two exemptions applicable to Fire Areas ETN-4 (Electrical Tunnels and Electrical Penetration Areas) and PAB-2 (Component Cooling Pump Area) contained in the January 7, 1987 SER (Reference 8.1), this attachment:

- Discusses the licensing basis for the one-hour Hemyc electrical raceway fire barrier system (ERFBS) (Section 2.0);
- Discusses the fire hazards, combustible controls, and fire protection features of the areas (Section 3.0);
- Evaluates the acceptability of a 30-minute rating considering the current fire hazards and fire protection features in the areas (Section 4.0);
- Presents a summary description of the installed one-hour Hemyc ERFBS configurations, and of the evaluation of the results of the NRC Hemyc fire test program (Reference 8.11) (Section 5.0).

As documented in Reference 8.11, the NRC Hemyc test specimens provided acceptable thermal performance for a period of at least 30 minutes, or the results provided insight into the observed failure mechanisms. Further, each of the installed IP3 Hemyc configurations is bounded by one or more of the NRC test specimens, or is subject to a planned modification based on the insights learned from the NRC test program. As determined in Reference 8.11, the Hemyc ERFBS at IP3 can be expected to provide a fire resistance rating of a minimum of 30 minutes, consistent with ASTM E 119 temperature rise acceptance criteria. A fire resistance rating of 30 minutes will provide adequate protection for the affected IP3 safe-shutdown raceways, in consideration of the additional mitigating factors of low fire loading and active and passive fire protection features installed in each of the two affected plant areas.

2.0 EXISTING LICENSING BASIS FOR ONE-HOUR ERFBS IN AFFECTED PLANT AREAS

2.1 Electrical Tunnels and Penetration Areas: Fire Area ETN-4: Upper and Lower Electrical Tunnels (Fire Zones 7A and 60A, respectively) and Upper Penetration Area (Fire Zone 73A)

By SER dated February 2, 1984 (Reference 8.4), the Staff approved an exemption from the Appendix R Section III.G separation requirements, to the extent that redundant safe-shutdown systems are not separated by more than 20 feet free of intervening combustibles or fire hazards, and that redundant safe-shutdown systems are not separated by a one-hour rated fire barrier in an area which is protected by automatic fire detection and suppression systems. The bases for this exemption included the existing separation between redundant safe-shutdown trains, minimal fire hazards, flame-retardant characteristics of cable insulation, and the installed active and passive fire protection features.

Following a comprehensive reassessment of the IP3 Appendix R compliance basis, by letters dated August 16, 1984 and September 19, 1985 (References 8.3 and 8.2, respectively), NYPA informed the NRC of the need for additional separation measures to be installed in Fire Area ETN-4. These measures included the installation of one-hour rated fire wrap on several safe-shutdown raceways. By SER dated January 7, 1987 (Reference 8.1), the Staff acknowledged this clarification and the addition of one-hour rated fire wrap, and confirmed the continued validity of the exemption granted by the February 2, 1984 SER (Reference 8.4).

2.2 Primary Auxiliary Building, Fire Area PAB-2: Fire Zone 1, 41' Elevation CCW Pump Area

In the SER dated January 7, 1987 (Reference 8.1), the Staff approved an exemption from the Section III.G separation requirements for this fire zone, to the extent that an automatic suppression system has not been provided, and redundant safe-shutdown systems are not separated by more than 20 feet free of intervening combustibles. The bases for this exemption included the existing separation between redundant safe-shutdown trains, low fire loading, a fire detection system, manual hose stations and portable extinguishers, a partial height noncombustible barrier designed to protect the CCW pump against radiant heat from a fire, and a one-hour fire rated cable wrap around the normal power feed conduit to the 33 CCW pump.

3.0 FIRE HAZARDS, COMBUSTIBLE CONTROLS, AND FIRE PROTECTION FEATURES IN FIRE AREAS ETN-4 AND PAB-2

3.1 Evaluation of Hazards/Ignition Sources and Combustible Controls

The fire hazards and ignition sources in Fire Areas ETN-4 and PAB-2 remain materially unchanged from the characteristics of these areas as described in the SERs dated February 2, 1984 (Reference 8.4) and January 7, 1987 (Reference 8.1), and the NYPA correspondence referenced therein, as applicable to the specific fire zone.

Transient combustible and hot work controls have been enhanced since the transition from NYPA to Entergy operation of IP3, with the issuance of procedures EN-DC-127, "Control of Hot Work and Ignition Sources" (Reference 8.8) and ENN-DC-161, "Transient Combustible Program" (Reference 8.9). Notably, per Transient Combustible Program procedure ENN-DC-161, Fire Areas ETN-4 and PAB-2 are designated as "Level 2" combustible control areas, which constrains transient combustibles to moderate quantities. Any planned introduction of more than the allowable quantities of combustibles into these areas requires a prior review by Fire Protection Engineering, which will include the definition of additional protective/compensatory measures as determined to be applicable. In addition, per procedure EN-DC-127, any planned hot work in IP3 Fire Areas ETN-4 or PAB-2 requires the prior review and approval of Fire Protection Engineering. This constraint provides assurance that hazards and potential effects consistently receive proper prior evaluation, and that compensatory measures, as applicable, are adequately defined in advance of the hot work activity.

The administrative controls imposed by ENN-DC-161 and the structured Fire Protection Engineering review of planned hot work activities per EN-DC-127 provide additional assurance that the potential for, and potential effects of, significant floor-based transient combustible fires is sharply limited.

3.2 Active Protection: Fire Detection and Suppression Features

The installed fire detection systems and automatic and manual fire suppression features in the affected zones of Fire Areas ETN-4 and PAB-2 remain functionally unchanged from those described in SERs dated February 2, 1984 (Reference 8.4) and January 7, 1987 (Reference 8.1), and the NYPA correspondence referenced therein, as applicable. Preaction automatic water spray suppression is provided in ETN-4 for protection of cable trays; manual suppression capabilities are provided in both Fire Areas ETN-4 and PAB-2, in the form of accessible fire hose stations and portable fire extinguishers.

3.3 Passive Fire Protection Features

The installed passive fire protection features (fire barriers and penetration seal systems) in Fire Areas ETN-4 and PAB-2 remain functionally unchanged from those described in SERs dated February 2, 1984 (Reference 8.4) and January 7, 1987 (Reference 8.1), and the NYPA correspondence referenced therein, as applicable.

3.4 Transient Combustible Control and FP Equipment Operating History

A review of IP3 condition reports for the period beginning with Entergy ownership through the present indicated that no significant fire protection related deficiencies applicable to Fire Zones 1, 7A, 60A, or 73A were identified during this time period. Topics searched included fire barriers, ERFBS, fire suppression, fire detection, and housekeeping/combustible loading. Hence, there is reasonable assurance that the design and operational controls (as described above) in place since the transition to Entergy operation of IP3 have maintained the fire protection defense-in-depth measures consistent with the IP3 fire protection licensing basis.

4.0 **ADEQUACY OF A 30-MINUTE ERFBS TO PROTECT SAFE-SHUTDOWN CABLES**

4.1 Fire Area ETN-4, Fire Zones 7A, 60A, and 73A

As described in the SER dated February 2, 1984 (Reference 8.4), the fire hazards in the affected zones of this area are small. As given by Reference 8.7, the calculated fire severity in Fire Area ETN-4 is less than 60 minutes, of which less than one minute of fire severity is attributable to the expected transient fire loading. The balance of the combustible inventory is predominantly asbestos-jacketed, flame-retardant electrical cable insulation. The flame-retardant characteristics of the principal combustible ensure that fire will not propagate along the cables to any significant degree, thereby limiting the rate of development and damage incurred by credible fires. As the credible fire scenarios involve floor-based transient combustibles, the impact of such a fire, at any location within the area, is expected to be slight, and insufficient to involve substantial quantities of the predominant fixed combustibles (the flame-retardant cables in trays). In addition, the fire detection, automatic cable tray fire suppression system, and manual fire suppression features provide further assurance that fire damage will be limited in scope and severity. Therefore, based on the current Fire Hazards Analysis, an ERFBS with a 30-minute fire resistance rating is adequate to protect the safe-shutdown cables in this area.

Based on a review of the fire zones in this area using the guidance and tools of NUREG-1805 (Reference 8.10), it was found that the credible fire challenge would be less severe than that imposed by an ASTM E 119 fire exposure. Further, with the installed smoke detection system and the preaction water spray system for the cable trays in the area, the credible fire challenge in the affected zones of Fire Area ETN-4 can be expected to result in a temperature profile that is substantially less severe than that of the ASTM E 119 time-temperature curve. Therefore, based on the insights using NUREG-1805 guidance and tools, the expected fire effects in this Fire Area will not challenge a Hemyc ERFBS installation that has a fire resistance rating of 30 minutes.

4.2 Fire Area PAB-2, Fire Zone 1

As described in the SER dated January 7, 1987 (Reference 8.1), the fire load in this area is low. As given by Reference 8.7, the calculated fire severity in Fire Area PAB-2, Fire Zone 1 is less than 10 minutes. The small quantity of combustible materials (e.g., CCW pump lubricating oil or transient materials) would be expected to result in a credible fire which is localized, with a low aggregate heat release, and no challenge to redundant safe-shutdown cables or components caused by radiant or convective energy. The installed fire detection system would ensure timely detection, enable prompt manual suppression of the fire, and provide assurance that any fire damage will be limited in scope and severity. Therefore, the credible fire challenge can be expected to result in a temperature profile less severe than that of the ASTM E 119 time-temperature curve.

Hence, an ERFBS capable of providing at least 30 minutes of protection for the enclosed cables when tested in accordance with ASTM E 119 will provide adequate protection for the safe-shutdown cables in this area, given the hazards in the area and the active fire protection features.

5.0 **EVALUATION OF IP3-SPECIFIC HEMYC ERFBS VERSUS NRC-TESTED CONFIGURATIONS**

The installed IP3 Hemyc ERFBS is summarized as follows:

- Two 4" rigid steel conduits, each with a cable percent fill of approximately 30%. The two 4" rigid steel conduits are protected with direct-attached 2" thick Hemyc blanket wrap.
- Seven 18" cable tray sections, with a cable percent fill in these trays ranging from approximately 10% to 25%. Also wrapped are two 24" cable tray sections, each with a cable percent fill of approximately 50%. All cable trays

are wrapped using 1-1/2" thick Hemyc blanket with a 2" air gap between the blanket and the protected raceway.

- Box-type enclosure at containment electrical penetrations H19/H20, consisting of 2" thick Hemyc blanket directly attached to the enclosure.

The IP3 Hemyc ERFBS configurations have been compared to the size, orientation, materials, methods of construction, and thermal performance of the test specimens of References 8.5 and 8.6 in an engineering evaluation (Reference 8.11). The detailed thermal performance results of the NRC Hemyc fire tests indicated that several of the tested configurations provided at least 30 minutes of protection for the enclosed safe-shutdown cables, or provided insights into the failure mechanisms that occurred during testing. The engineering evaluation compares the details of these tested configurations with the details of the IP3 Hemyc ERFBS configurations. This evaluation establishes that the IP3 Hemyc ERFBS configurations are sufficiently comparable to the NRC-tested configurations, with minor enhancements to several IP3 configurations, which include the need to augment the ERFBS on raceway supports and to install additional over-banding on certain enclosures. Pending implementation of those modifications to the affected configurations, all of the IP3 Hemyc ERFBS configurations can be expected to provide a fire resistance capability of at least 30 minutes for the enclosed safe-shutdown cables.

6.0 REGULATORY ANALYSIS

10 CFR 50.12(a) states that the Commission may grant exemptions from the requirements of the regulations contained in 10 CFR 50 which are:

- (1) Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security; and,
- (2) If special circumstances are present.

This request for revision of existing exemptions meets the criteria set forth in 10 CFR 50.12, as discussed herein.

6.1 The requested exemption is authorized by law

10 CFR 50.12(a) authorizes the NRC to grant exemptions from its regulations, and no law is known that precludes the NRC from granting the requested revision to the existing exemptions.

6.2 The requested exemption does not present an undue risk to the public health and safety

The Hemyc ERFBS configurations installed in IP3 Fire Areas ETN-4 and PAB-2 will provide a fire resistance capability of at least 30 minutes, as discussed in Section 5.0. The minimal fire hazards and ignition sources, combined with the nature of the fire hazards in the areas, the active and passive fire protection features, and the controls on transient combustibles and ignition sources, as discussed in Section 3.0, provide assurance that the credible fire challenge to the IP3 Hemyc ERFBS will be substantially less than that of an equivalent ASTM E 119 30-minute fire exposure. Therefore, as discussed in Section 4.0, the installed ERFBS can be expected to provide adequate protection for the affected safe-shutdown raceways and enclosed cables.

Therefore, given the existing level of fire protection defense in depth, combined with the minimal fire challenge presented by the credible fire scenarios in these areas, and the favorable FP equipment operating history, the change in credited ERFBS fire resistance rating from one hour to 30 minutes will not degrade the effectiveness of the IP3 fire protection program, nor will it challenge the credited post-fire safe-shutdown capability. Based on the determination that safe shutdown in the event of a fire can be achieved and maintained with less than a one-hour fire resistance rating, the requested revision to the existing exemptions does not present an undue risk to the public health and safety.

6.3 The requested exemption is consistent with the common defense and security

The requested revision to the existing exemptions is not directly related to and should not adversely impact the common defense and security.

6.4 Special circumstances are present – underlying purpose of the rule

10 CFR 50.12(a) requires that special circumstance be present in order for the Commission to consider granting an exemption. Per 10 CFR 50.12(a)(2)(ii), one special circumstance is that application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

The underlying purpose of 10 CFR 50, Appendix R, Section III.G is to provide reasonable assurance that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire. For the areas containing the Hemyc ERFBS installations, the credible fire challenge to the IP3 Hemyc ERFBS due to any postulated fire will be substantially less than that of an equivalent ASTM E 119 30-minute fire exposure. Therefore, a fire

resistance capability of at least 30 minutes provides protection of the components required for achieving and maintaining safe shutdown. Therefore, the underlying purpose of the rule is satisfied and the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule.

7.0 CONCLUSION

The defense-in-depth objectives of the Fire Protection Program are to

- 1) Prevent fires from occurring;
- 2) Detect, control, and extinguish promptly those fires that do occur; and,
- 3) Provide protection from the effects of a fire for structures, systems, and components needed to achieve and maintain safe shutdown.

The fire hazards analysis of the fire zones containing the Hemyc ERFBS installations and the existing protection (after completion of modifications discussed in Section 5.0) of the electrical raceways show that these objectives are met. The first objective is supported by the fact that there are few significant ignition sources¹ in the areas, and transient combustibles are controlled. Supporting the second objective are the active fire detection and suppression features in each area. The third objective is supported by the Hemyc ERFBS configurations which provide protection from credible fire exposures, which have an expected duration less than that of the proposed 30 minute rating.

This request for revision of existing exemptions is warranted under the provisions of 10 CFR 50.12, in that it is authorized by law, does not present an undue risk to the public health and safety, and is consistent with the common defense and security. Further, it meets the requirement for a special circumstance in that it satisfies the underlying purpose of 10 CFR 50 Appendix R by providing an ERFBS that will provide protection for the duration of any postulated fire such that safe shutdown can be achieved and maintained.

¹ Ignition sources in the affected fire zones consist of limited transient combustibles (all zones), several equipment cabinets and (3kVA) 480/120V instrument power transformer BH8 (Fire Zone 73A), and a CCW pump motor (Fire Zone 1)

8.0 REFERENCES

- 8.1 NRC Letter and SER, S. A. Varga to J. C. Brons (NYPA); Indian Point 3 Nuclear Power Plant - Exemption From Certain Requirements of Section III.G and III.J of Appendix R to 10 CFR Part 50, January 7, 1987
- 8.2 NYPA Letter, J. C. Brons to S. A. Varga (NRC); Information to Support the Evaluation of IP3 to 10 CFR 50.48 and Appendix R to 10 CFR 50, September 19, 1985
- 8.3 NYPA Letter, J. C. Brons to S. A. Varga (NRC); Appendix R Fire Protection Program, August 16, 1984
- 8.4 NRC Letter and SER, S. A. Varga to J. C. Brons (NYPA); Exemptions From the Requirements of 10 CFR 50, Appendix R, for the Indian Point Nuclear Generating Plant, Unit No. 3 (IP-3), February 2, 1984
- 8.5 Hemyc (One-Hour) Electrical Raceway Fire Barrier Systems Performance Testing; Conduit and Junction Box Raceways (Omega Point Laboratories Fire Test Report, Project 14790-123263, dated April 11, 2005)
- 8.6 Hemyc (One-Hour) Electrical Raceway Fire Barrier Systems Performance Testing; Cable Tray, Cable Air Drop and Junction Box Raceways (Omega Point Laboratories Fire Test Report, Project 14790-123264, dated April 18, 2005)
- 8.7 IP3-ANAL-FP-02143, Indian Point 3 Fire Hazards Analysis, Revision 4
- 8.8 EN-DC-127, Control of Hot Work and Ignition Sources, Revision 2
- 8.9 ENN-DC-161, Transient Combustible Program, Revision 1
- 8.10 NUREG-1805, "Fire Dynamics Tools (FDTs) Quantitative Fire Hazard Analysis Methods for the U.S. NRC Fire Protection Inspection Program," December 2004.
- 8.11 Entergy Engineering Report IP-RPT-06-00062, Revision 0; "Comparison of IP3 Hemyc Electrical Raceway Fire Barrier System to NRC Hemyc Fire Test Results."

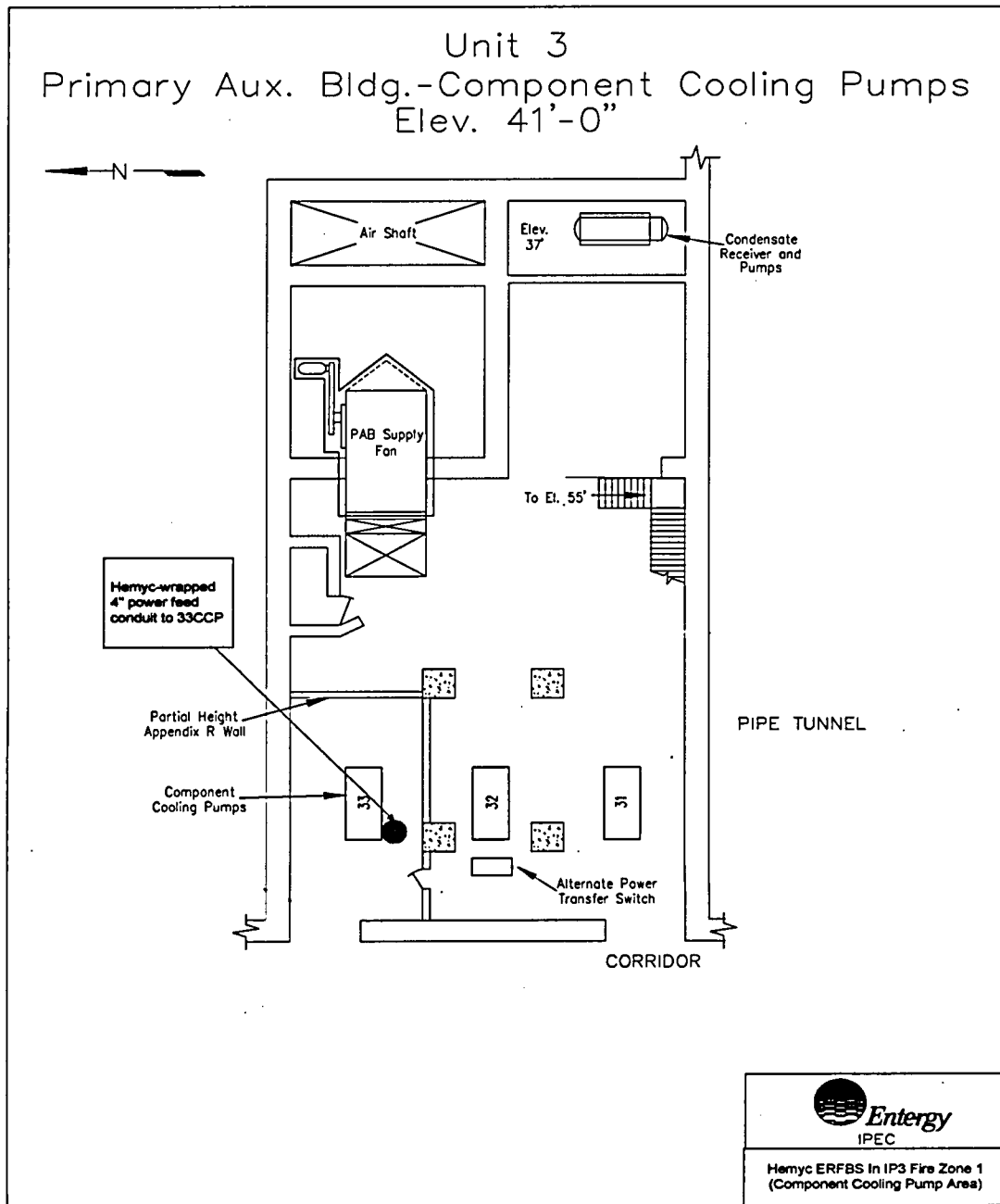
9.0 FIGURES

9.1 Hemyc ERFBS in Fire Zone 1

9.2 Hemyc ERFBS in Fire Zone 7A

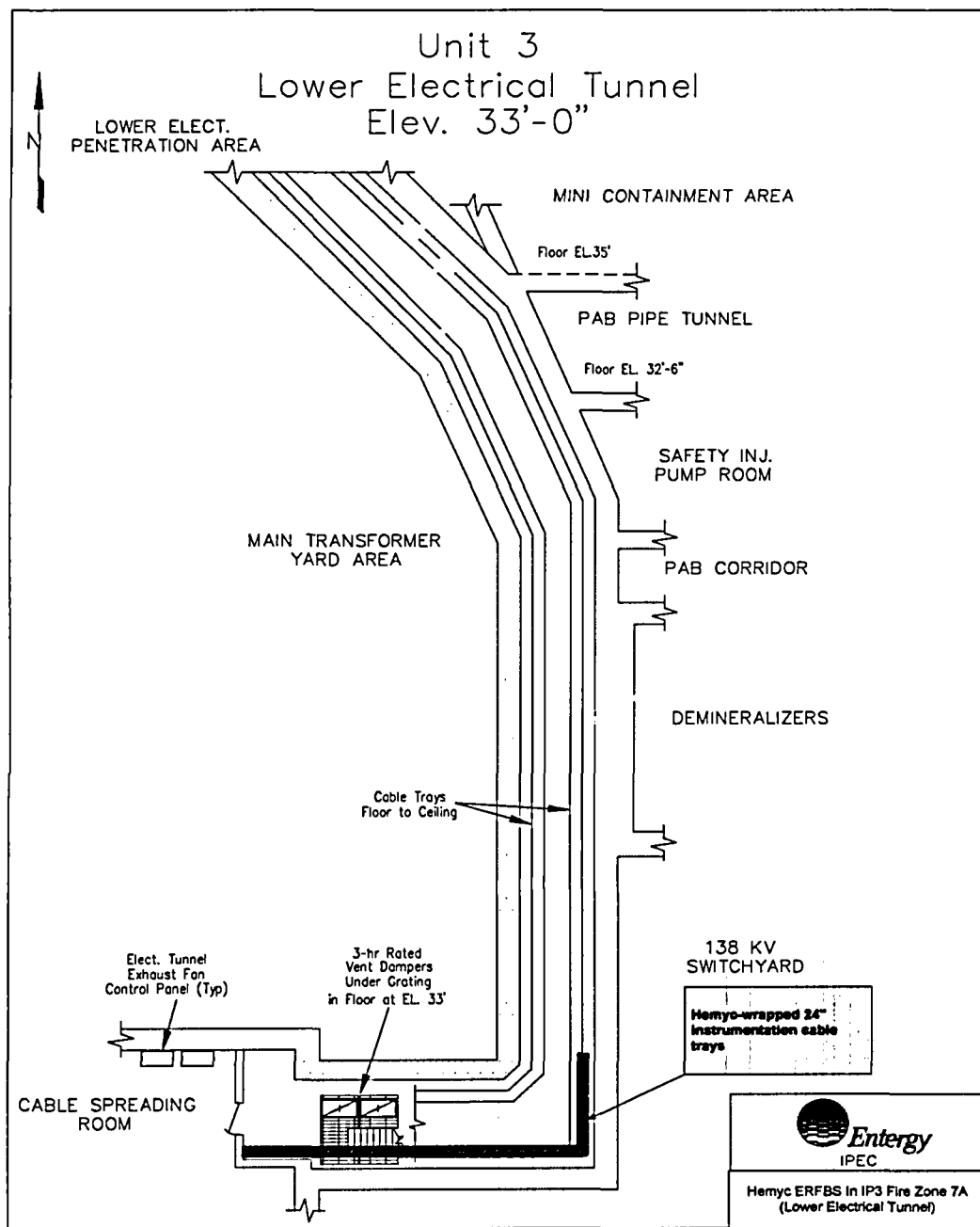
9.3 Hemyc ERFBS in Fire Zone 60A

9.4 Hemyc ERFBS in Fire Zone 73A



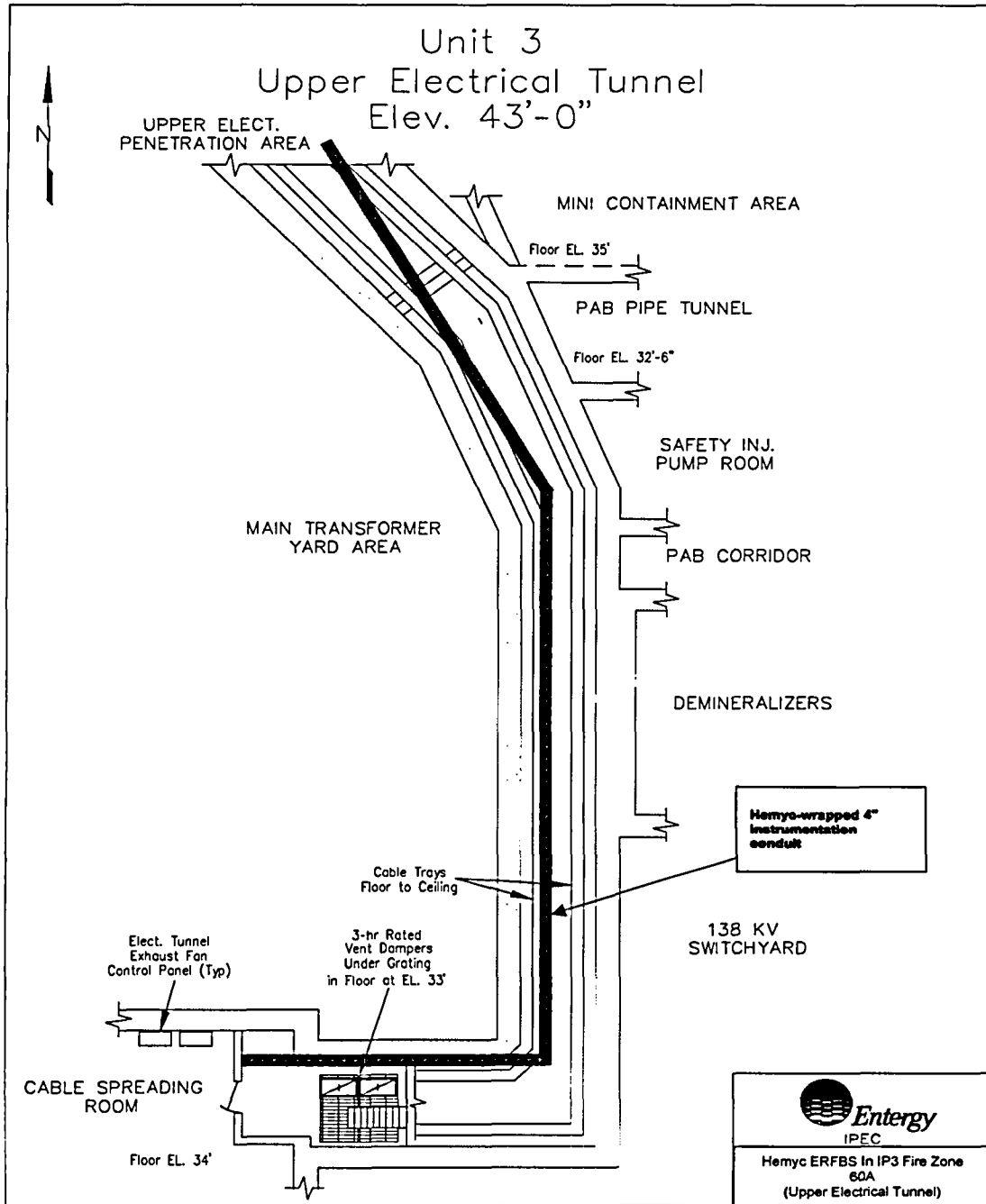
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Figure 9.1: Hemyc ERFBs in Fire Zone 1



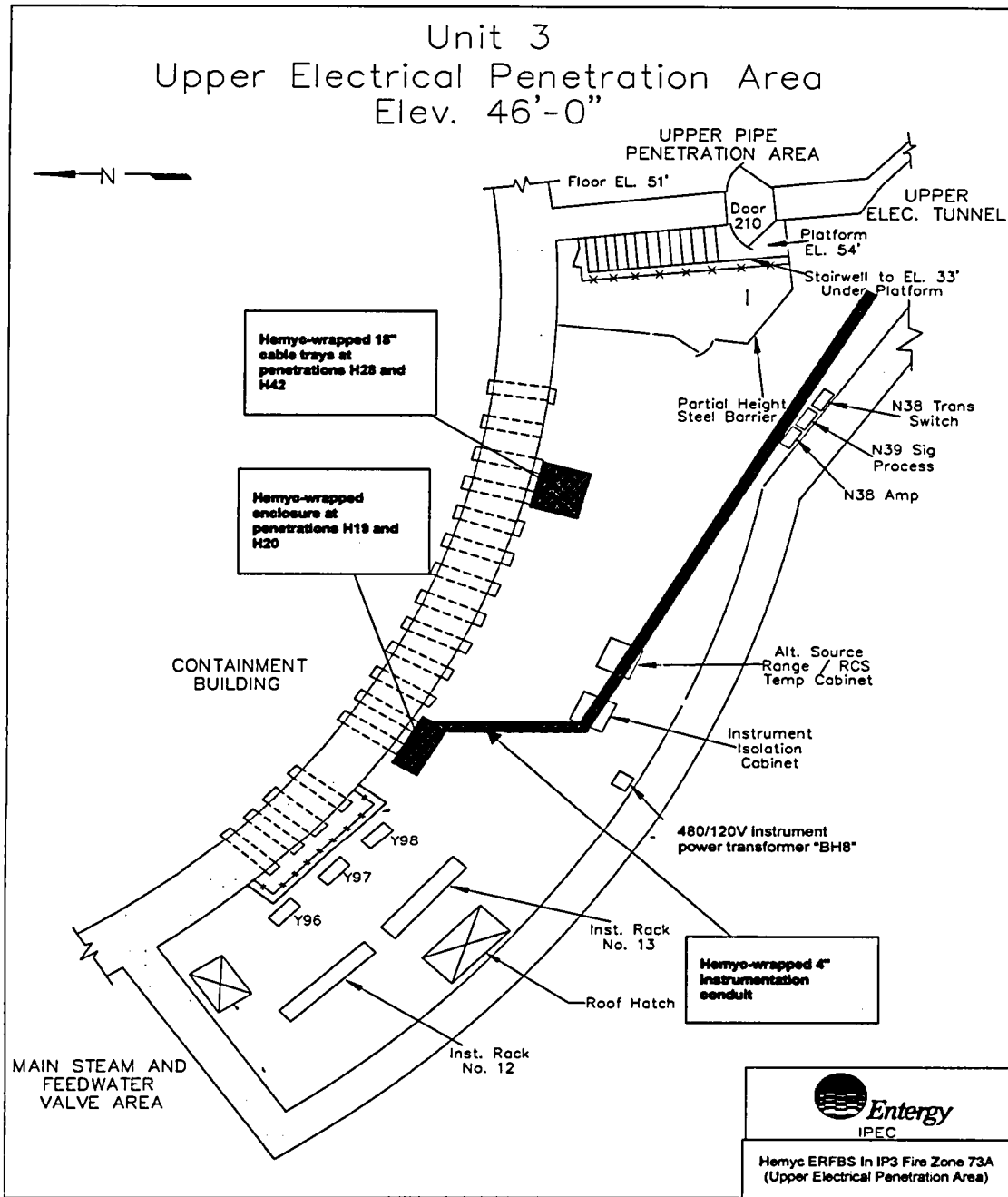
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Figure 9.2: Hemyc ERFBS in Fire Zone 7A



PPF-357

Figure 9.3: Hemyc ERFBS in Fire Zone 60A



PPF-358

Figure 9.4: Hemyc ERFBs In Fire Zone 73A