UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and 50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	March 22, 2013

ENTERGY'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW FOR CONTENTIONS NYS-6 AND NYS-7 (NON-ENVIRONMENTALLY QUALIFIED INACCESSIBLE MEDIUM- AND LOW- VOLTAGE CABLES)

William B. Glew, Jr., Esq.
William C. Dennis, Esq.
ENTERGY SERVICES, INC.
440 Hamilton Avenue
White Plains, NY 10601
Phone: (914) 272-3202
Fax: (914) 272-3205
E-mail: wglew@entergy.com
E-mail: wdennis@entergy.com

Kathryn M. Sutton, Esq.
Paul M. Bessette, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004
Phone: (202) 739-3000
Fax: (202) 739-3001
E-mail: ksutton@morganlewis.com
E-mail: pbessette@morganlewis.com

Martin J. O'Neill, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1000 Louisiana Street
Suite 4000
Houston, TX 77002
Phone: (713) 890-5710
Fax: (713) 890-5001
E-mail: martin.oneill@morganlewis.com

COUNSEL FOR ENTERGY NUCLEAR OPERATIONS, INC.

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Pursuant to 10 C.F.R. § 2.1209, and the Atomic Safety and Licensing Board's ("Board") February 28, 2013 Order,[1] Entergy Nuclear Operations, Inc. ("Entergy") submits its Proposed Findings of Fact and Conclusions of Law ("Proposed Findings and Conclusions") on New York State ("New York") Contentions NYS-6 and NYS-7 (together, "NYS-6/7"). The Proposed Findings and Conclusions are based on the evidentiary record in this proceeding, and are submitted in the form of a proposed Partial Initial Decision by the Board. The Proposed Findings and Conclusions are set out in numbered paragraphs, with corresponding citations to the record of this proceeding.

I. INTRODUCTION

1. This Partial Initial Decision presents the Board's Findings of Fact and Conclusions of Law on Contention NYS-6/7, which alleges that Entergy lacks adequate aging management programs ("AMPs") for non-environmentally-qualified ("EQ") inaccessible medium-voltage and low-voltage cables at the Indian Point Energy Center ("IPEC").

[1] Licensing Board Order (Granting Parties Joint Motion for Alteration of Filing Schedule) at 1 (Feb. 28, 2013) (unpublished).

2. For the reasons set forth below, the Board finds that Entergy has carried its burden of proof to demonstrate that it has taken, or will take, actions necessary to provide reasonable assurance that the effects of aging will be managed for non-EQ inaccessible low- and medium-voltage cables during the period of extended operation.

3. In particular, the Board concludes that IPEC's Non-EQ Inaccessible Medium-Voltage Cable Program ("Inaccessible Cable Program"), as described in the IPEC license renewal application, is consistent with the AMP described in the relevant Nuclear Regulatory Commission ("NRC" or "Commission") guidance, and therefore, provides reasonable assurance that Entergy will manage aging effects on all non-EQ inaccessible low- and medium-voltage cables during the period of extended operation. Moreover, the Inaccessible Cable Program is clearly linked to its implementing procedure, and the procedure provides specific details on how Entergy will implement the AMP. The Board also finds that the essential elements of the implementing procedure have been incorporated as binding and enforceable license renewal commitments. Consequently, we conclude that the Inaccessible Cable Program – both by itself and together with its implementing procedure and Entergy's license renewal commitments – is sufficiently specific and provides the requisite reasonable assurance that Entergy will adequately manage aging effects on all below-ground low- and medium-voltage cables within the scope of the program during the period of extended operation.

4. The Board further finds that thermal stress caused by "ohmic" heating or mutual heating of inaccessible below-grade cables is not an aging management concern at IPEC, because the cables at issue were appropriately designed to minimize the potential for unacceptable heating. Even if such heating were to occur, however, there is reasonable assurance that Entergy's cable testing program will detect resulting heat-related degradation long

before cable failure. The record indicates that ohmic heating has not caused any cable insulation degradation at IPEC.

5. In addition, we are satisfied that Entergy has made appropriate commitments regarding the Inaccessible Cable Program as part of the license renewal application process and that the NRC Staff has appropriate processes to ensure that Entergy complies with its commitments and internal procedures, including audits, inspections, and potential enforcement actions. Moreover, any modifications that Entergy makes to its procedures are subject to a rigorous internal review process, as well as NRC oversight.

6. Finally, the Board finds that IPEC's Non-EQ Insulated Cables and Connections Program ("Cables and Connections Program") provides reasonable assurance that Entergy will adequately manage aging effects on all above-ground medium- and low-voltage cables within the scope of the program.

7. The Board thus enters a ruling on the merits of Contention NYS-6/7 in favor of Entergy.

II. PROCEDURAL HISTORY OF CONTENTIONS NYS-6 AND NYS-7

A. Application Submittal and Contentions NYS-6 and NYS-7

8. On April 23, 2007, Entergy applied to renew the IPEC Unit 2 and Unit 3 ("IP2" and "IP3") operating licenses for 20 years beyond their current expiration dates of September 28, 2013, and December 12, 2015, respectively.[2] As relevant here, the IPEC license renewal application ("LRA") described two AMPs related to non-EQ cables – the Inaccessible Cable

[2] Letter from Fred Dacimo, Site Vice President, Entergy, to NRC, Document Control Desk (Apr. 23, 2007), *available at* ADAMS Accession No. ML071210512 (supplemented by letters dated May 3, 2007 and June 21, 2007, *available at* ADAMS Accession Nos. ML071280700 and ML071800318).

Program and the Cables and Connections Program – in LRA Sections B.1.23 and B.1.25, respectively.[3]

9. As originally described in LRA Section B.1.23, the Inaccessible Cable Program applied to non-EQ inaccessible medium-voltage cables that have a license renewal intended function and are exposed to significant moisture (*i.e.*, wetting or submergence of cables that lasts for more than a few days[4]) simultaneously with significant applied voltage (*i.e.*, exposure to system voltage for more than 25% of the time).[5] The LRA stated that Entergy would test in-scope cables to determine the condition of the insulation at least once every ten years and inspect manholes for water accumulation at least once every ten years.[6] The LRA further indicated that Entergy would implement the Inaccessible Cable Program prior to the period of extended operation ("PEO").[7] In addition, Entergy stated that the Inaccessible Cable Program would be consistent with the corresponding AMP described in Section XI.E3 of the applicable NRC

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3 *See* Indian Point Energy Center License Renewal Application at B-81, B-85 (Apr. 2007) ("LRA") (ENT00015B). "Non-EQ" cables are cables that are not required to be environmentally qualified in accordance with 10 C.F.R. § 50.49. *See* Testimony of Entergy Witnesses Alan B. Cox, Roger B. Rucker, Thomas S. McCaffrey, and Howard G. Sedding Concerning Contentions NYS-6/NYS-7 (Non-EQ Inaccessible Medium- and Low-Voltage Cables) at 19 (A31) (Sept. 21, 2012) ("Entergy Testimony") (ENTR00233). Such cables are used in mild plant environments or, by design, are not required to remain functional during or following exposure to environmental conditions (*e.g.*, temperature and pressure, humidity, chemical effects, radiation, submergence) caused by a design basis event. *Id.* A cable can be "inaccessible" because it is installed underground or below-grade. *Id.* at 19 (A32). Below-grade inaccessible cables can include cables in underground conduits, trenches, troughs, and duct banks or cables that are directly buried in soil. *Id.* Aboveground cables can also be inaccessible because they are located inside enclosures that make them difficult to access. *Id.* "Low-voltage" power cables have an operating voltage ranging from 400 volts to 2 kilovolts ("kV"). *Id.* at 20 (A33). "Medium-voltage" power cables have an operating voltage ranging from 2 kV to 35 kV. *Id.*

4 *See* NRC Staff Testimony of Cliff Doutt and Duc Nguyen Concerning NYS Contention 6 and 7 (Lack of a Specific Plan for the Aging Management of Non-Environmentally-Qualified Inaccessible Medium and Low-Voltage Cables and Wiring) at 12 (A13) (Mar. 30, 2012) ("NRC Staff Testimony") (NRC000077).

5 Entergy Testimony at 34 (A56) (ENTR00233). As described below, Entergy subsequently expanded the scope of this program to include low-voltage cables.

6 LRA at B-81 (ENT00015B).

7 *Id.*

guidance – Revision 1 of the "GALL Report."[8] Revision 2 of the GALL Report was subsequently issued in December 2010, several years after Entergy had submitted its LRA.[9]

10. The GALL Report contains the NRC Staff's generic evaluation of existing plant programs and documents the technical basis for determining when existing programs are adequate without modification and when they should be augmented for the period of extended operation.[10] The GALL Report also identifies AMPs that the Staff has determined to be acceptable to manage aging effects of systems, structures, and components ("SSCs") in the scope of license renewal, as required by 10 C.F.R. Part 54.[11]

11. IPEC's Cables and Connections Program, described in LRA Section B.1.25, applies to above-grade low- and medium-voltage cables and connections that have a license renewal function that are located in an adverse local equipment environment ("ALEE") caused by temperature, radiation, or moisture.[12] An ALEE is a localized environmental condition (*e.g.*, elevated temperature, radiation) within a nuclear power plant that exceeds the plant design basis

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8 *Id.* (citing NUREG-1801, Rev. 1, Generic Aging Lessons Learned (GALL) Report (Sept. 2005) ("GALL Report, Rev. 1") (NYS00146A-C)).

9 NUREG-1801, Rev. 2, Generic Aging Lessons Learned (GALL) Report (Dec. 2010) ("GALL Report, Rev. 2") (NYS00147A-D). In Revision 2 of the GALL Report, the Staff increased the scope of the Section XI.E3 AMP to include non-EQ inaccessible low-voltage cables and cables exposed to adverse environments (and not just significant moisture). *Id*. at XI E3-2 (NYS00147D). Other significant changes from the Revision 1 AMP include guidance that: (1) manhole inspections should occur based on plant-specific operating experience with cable wetting or submergence in manholes, but at least annually (frequency was previously unspecified); (2) cable testing should occur once at least every six (as opposed to ten) years; (3) trending actions should be included as part of the AMP (not previously included); and (4) potential corrective actions for unacceptable cable conditions (not previously identified) should include installation of permanent drainage systems, sump pumps, alarms, more frequent inspections or testing, and replacement of the affected cable. *Id*. at XI E3-2 to XI E3-3; *cf*. GALL Report, Rev. 1 at XI E-8 to XI E-9 (NYS00146C).

10 Gall Report, Rev. 2, at iii (NYS00147A).

11 *Id.* at 1.

12 Entergy Testimony at 18 tbl. 1 (A30) (ENTR00233). A cable "connection" is a device used to join or fasten together cable conductors to other cables or electrical devices. Connections or terminations may include plug-in connectors, splices, terminal blocks, and fuse holders. *Id.* at 25 (A40).

ambient environment for the cable or connection insulation material and which, as a result, could increase the rate of aging of a component or adversely affect operability.[13]

12. The LRA stated that Entergy would visually inspect a representative sample of accessible cables and connections for anomalies such as embrittlement, discoloration, cracking, or surface contamination.[14] The LRA also noted that the sampling will be performed in accordance with Electric Power Research Institute ("EPRI") guidance document TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments."[15] The LRA further stated that Entergy would implement the Cables and Connections Program prior to the PEO and that it would be consistent with the corresponding AMP described in Section XI.E1 of the GALL Report, Rev. 1.[16]

13. On August 1, 2007, the NRC published a *Federal Register* notice of acceptance for docketing and opportunity for hearing.[17] The notice explicitly clarified that proposed contentions "shall be limited to matters within the scope of [license renewal]."[18] The notice stated that any person whose interest would be affected by the proceeding and who wished to participate as a party in the proceeding must file a petition for leave to intervene and request for

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13 *Id.* at 29-30 (A46).

14 LRA at B-85 (ENT00015B).

15 *Id.* (citing EPRI document TR-109619, Guideline for the Management of Adverse Localized Equipment Environments (June 1999) (ENT000239)).

16 *Id.*

17 Entergy Nuclear Operations, Inc., Indian Point Nuclear Generating Unit Nos. 2 and 3; Notice of Acceptance for Docketing of the Application and Notice of Opportunity for Hearing Regarding Renewal of Facility Operating License Nos. DPR-26 and DPR-64 for an Additional 20-Year Period, 72 Fed. Reg. 42,134 (Aug. 1, 2007).

18 *Id.* at 42,135.

hearing within 60 days of the notice (*i.e.*, October 1, 2007).[19] Subsequently, on October 1, 2007, the Commission extended the period for filing requests for hearing until November 30, 2007.[20]

14. On November 30, 2007, New York filed a petition to intervene, proposing various contentions, including NYS-6 and NYS-7.[21] As proffered in November 2007, NYS-6 alleged that the IPEC LRA failed to comply with 10 C.F.R. §§ 54.21(a) and 54.29 because the LRA lacked an adequate plan for managing aging of non-EQ inaccessible medium-voltage cables.[22] In particular, New York alleged that Entergy had not (1) identified the location and extent of non-EQ inaccessible medium-voltage cables in use at IP2 and IP3; (2) fully disclosed its aging management program and certain EPRI guidance documents referenced in the program; (3) addressed specific recommendations contained in guidance documents issued by the NRC and the U.S. Department of Energy's ("DOE") Sandia National Laboratories ("Sandia") related to inspection of manholes for water accumulation and testing of medium-voltage cables exposed to significant moisture; and (4) justified differences between programs for the aging management of accessible cables and inaccessible cables.[23]

15. Entergy opposed the admission of NYS-6. Entergy asserted that New York had failed to address the LRA's description of the Inaccessible Cable Program set forth in LRA

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19 *Id.* at 42,134.

20 Entergy Nuclear Operations, Inc., Indian Point Nuclear Generating Unit Nos. 2 and 3; Notice of Opportunity for Hearing Regarding Renewal of Facility Operating License Nos. DPR-26 and DPR-64 for an Additional 20-Year Period: Extension of Time for Filing of Requests for Hearing or Petitions for Leave To Intervene in the License Renewal Proceeding, 72 Fed. Reg. 55,834 (Oct. 1, 2007).

21 *See* New York State Notice of Intention to Participate and Petition to Intervene (Nov. 30, 2007) ("New York Petition"), *available at* ADAMS Accession No. ML073400187.

22 *Id*. at 92.

23 *See id.* at 92-100.

Section B.1.23 and that New York had failed to show that the AMP was not in compliance with NRC regulations or guidance.[24]

16. The NRC Staff also opposed the admission of NYS-6 on the basis that New York had incorrectly asserted that information was omitted from the LRA.[25] The NRC Staff also noted that an applicant could satisfy the requirements of 10 C.F.R. § 54.21(a)(3) by committing to develop a program that meets the GALL Report, as was done in the IPEC LRA.[26] The NRC Staff concluded that Entergy had sufficiently addressed the issue in the LRA.[27]

17. With respect to Contention NYS-7, New York alleged that the IPEC LRA failed to comply with 10 C.F.R. §§ 54.21(a) and 54.29, because it lacked a specific AMP for non-EQ inaccessible low-voltage cables.[28] Specifically, New York asserted that the LRA failed to: (1) identify the locations of low-voltage cables; (2) provide any aging management program for such cables; and (3) describe the methodology purportedly used to exclude low-voltage cables from aging management review.[29]

18. Entergy opposed the admission of NYS-7, asserting that the LRA fully complied with NRC regulations and guidance for low-voltage cables.[30] Entergy pointed to LRA Sections 2.1, 2.5, and 3.6, which specifically addressed electrical components and insulated cables,

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[24] Answer of Entergy Nuclear Operations, Inc. Opposing New York State's Petition to Intervene and Request for Hearing at 57-58 (Jan. 22, 2008) ("Entergy Answer"), *available at* ADAMS Accession No. ML080300149.

[25] NRC Staff's Response to Petitions for Leave to Intervene Filed by (1) Connecticut Attorney General Richard Blumenthal, (2) Connecticut Residents Opposed to Relicensing of Indian Point, and Nancy Burton, (3) Hudson River Sloop Clearwater, Inc., (4) The State of New York, (5) Riverkeeper, Inc., (6) The Town of Cortlandt, and (7) Westchester County at 39 (Jan. 22, 2008) ("NRC Staff Answer"), *available at* ADAMS Accession No. ML080230543.

[26] *Id*. at 39-40.

[27] *Id*. at 40.

[28] New York Petition at 100.

[29] *Id.* at 101.

[30] Entergy Answer at 65.

including low-voltage cables.[31] Entergy also explained that its Cables and Connections Program, as described in LRA Section B.1.25, applied to low-voltage cables.[32]

19. The NRC Staff also opposed admission of NYS-7, on the ground that it failed to identify an omission from the application.[33] Furthermore, the NRC Staff stated that 10 C.F.R. §§ 54.21(a) and 54.29 did not require an applicant to propose a specific plan for inaccessible low-voltage non-EQ cables.[34]

20. On February 22, 2008, New York replied to Entergy's and the NRC Staff's Answers.[35] With respect to NYS-6, New York argued that a "promise to implement a program, without providing the details of the program to be implemented" was "insufficient to meet the requirements of 10 C.F.R. §§ 54.21 and 54.29."[36] New York made a similar argument for NYS-7, arguing that LRA Sections 2.1, 2.5, 3.6, and B.1.25 cited by Entergy and NRC Staff did not specifically address non-EQ inaccessible low-voltage cables.[37]

21. On March 10, 2008, the Board heard oral argument on whether NYS-6 and NYS-7, as well as New York's other proposed contentions, met the Commission's contention admissibility requirements.[38] At oral argument, New York reiterated its position that the LRA did not provide sufficient details regarding Entergy's AMPs for non-EQ inaccessible medium- and low-voltage cables.[39]

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31 *Id*. at 65-68.

32 *Id.* at 66.

33 NRC Staff Answer at 43.

34 *Id*.

35 New York State Reply in Support of Petition to Intervene (Feb. 22, 2008), *available at* ADAMS Accession No. ML080600444.

36 *Id*. at 43.

37 *Id*. at 55-57.

38 Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 (Mar. 10, 2008).

39 *Id*. at 188:20-189:18 (Sipos).

22. On July 31, 2008, the Board issued a ruling consolidating NYS-6 and NYS-7 and admitted them as combined contention NYS-6/7 to determine whether Entergy had developed AMPs that will adequately manage the effects of aging on non-EQ inaccessible medium-voltage and low-voltage power cables, such that those cables will continue to perform their intended functions during the IP2 and IP3 periods of extended operation.[40]

B. NRC Staff Review of the LRA and Entergy's Implementation of Its AMPs

23. The NRC Staff performed a detailed, independent review of Entergy's Inaccessible Cable Program and Cables and Connections Program, as well as the commitments Entergy described in LRA Sections B.1.23 and B.1.25.[41] As part of that process, the Staff issued formal requests for additional information ("RAIs") to obtain additional information on subsequent operating experience.[42] In support of its review of the IPEC LRA, the Staff spent over four weeks at the IPEC site in late 2007 and early 2008 conducting audits of Entergy's scoping and screening methodology, as well as its aging management reviews and AMPs.[43] The Staff documented its findings in an audit report, as well as the IPEC LRA Safety Evaluation Report ("SER") and Supplemental SER.[44] During these audits, the Staff verified through record reviews and questioning of Entergy personnel that the Inaccessible Cable Program was

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40 *Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 85-86, 218 (2008).

41 NRC Staff Testimony at 13 (A14) (NRC000077) ("[T]he Staff does not simply take the applicant at its word, but instead draws its own independent conclusion as to whether the applicant's programs are adequate."); Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 at 3998:6-4002:16 (Nguyen) (Dec. 12, 2012) ("Dec. 12, 2012 Tr.") (discussing the Staff's review process).

42 NRC Staff Testimony at 13 (A14) (NRC000077).

43 *Id*. at 13-15 (A14).

44 *Id.* at 14 (A14); *see also* Audit Report for Plant Aging Management Programs and Reviews For Indian Point Nuclear Generating Units Nos. 2 and 3 at 3-4 (Jan. 13, 2009) ("NRC Audit Report") (ENT000041); NUREG-1930, Vol. 1, Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 at 3-31 to -33 ("SER") (NYS00326B); NUREG-1930, Supp. 1, Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 at 3-5 to -9 ("Supplemental SER") (NYS000160).

consistent with Section XI.E3 of the GALL Report, Rev. 1, in addition to current industry operating experience and NRC recommendations.[45]

24. As noted above, the NRC issued Revision 2 of the GALL Report in December 2010. Shortly after the revised report's publication, in February 2011, the NRC issued an RAI to Entergy and other license renewal applicants requesting, among other things, additional information on the IPEC Inaccessible Cable Program.[46] Specifically, the Staff asked Entergy to respond to recent industry operating experience, and in particular, to: (1) explain how Entergy will manage aging effects on inaccessible low-voltage cables; (2) evaluate Entergy's proposed test and inspection frequencies in light of recent industry and plant-specific operating experience; and (3) explain how Entergy's AMP will ensure that test and inspection frequencies can be increased based on test and inspection results.[47]

25. In response to the RAI, Entergy submitted letters to the NRC Staff in March, July, and August 2011.[48] In its responses, Entergy indicated that it would amend its Inaccessible Cable Program to include low-voltage power cables, although Entergy did not change the program name after low-voltage cables were added to the scope of the program.[49] Entergy made

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45 NRC Staff Testimony at 6 (A4), 14-16 (A14-15) (NRC000077); Dec. 12, 2012 Tr. at 4060:11-14 (Nguyen) (NRC Staff agreed that Entergy has committed to a program consistent with Section XI.E3).

46 Letter from Kimberly J. Green, Safety Project Manager, NRC, to Vice President of Operations, IPEC, Request for Additional Information for the Review of the Indian Point Nuclear Generating Unit Numbers 2 and 3, License Renewal Application (Feb. 10, 2011) (NYS000150).

47 *Id*. Encl. at 5-6.

48 *See* NL-11-032, Letter from Fred Dacimo, Vice President, Entergy, to NRC, Document Control Desk, Response to Request for Additional Information (RAI) Aging Management Programs, Att. 1 at 10-14 (Mar. 28, 2011) ("NL-11-032") (NYS000151); NL-11-074, Letter from Fred Dacimo, Vice President, Entergy, to NRC, Document Control Desk, Response to Request for Additional Information (RAI) Aging Management Programs, Att. 1 at 15 (July 14, 2011) (NYS000152); NL-11-090, Letter from Fred Dacimo, Vice President, Entergy, to NRC, Document Control Desk, Clarification for Request for Additional Information (RAI) Aging Management Programs, Att. 1 at 1-2 (July 27, 2011) (NYS000153); NL-11-096, Letter from Fred Dacimo, Vice President, Entergy, to NRC, Document Control Desk, Clarification for Request for Additional Information (RAI) Aging Management Programs Attach. 1 at 1-3 (Aug. 9, 2011) (NYS000154).

49 NL-11-032, Attach. 1 at 10-14 (NYS000151).

the change to meet the intent of Section XI.E3 of the GALL Report, Rev. 2. In addition to revising the scope of the program to include low-voltage cables, Entergy made the following enhancements to the Inaccessible Cable Program:

- increased the scope of the program by removing the significant voltage exposure criterion applicable to medium-voltage cables subjected to system voltage for more than 25% of the time;
- increased the manhole inspection frequency to occur, at a minimum, annually;
- committed to evaluating manhole inspection results to determine the need to modify the manhole inspection frequency (*e.g.*, to increase the frequency, as appropriate);
- incorporated event-driven inspections of manholes (*e.g.*, following heavy rain or flooding) into the program;
- committed to test all inaccessible low-voltage and medium-voltage cables for insulation degradation at least once every six years; and
- committed to evaluate cable test results to determine the need for more frequent testing.[50]

26. After Entergy revised the Inaccessible Cable Program to include low-voltage cables and the other program enhancements, listed above, the Staff reviewed the revised program and concluded that it was consistent with the AMP described in Section XI.E3 of Revision 2 of the GALL Report.[51] Specifically, the Staff determined that Entergy's AMP was "consistent with industry operating experience and current Staff positions."[52] The Staff further concluded that Entergy had demonstrated that the effects of aging will be adequately managed so that the

[50] *See id.* Attach. 1 at 12.

[51] NRC Staff Testimony at 6 (A4) (NRC000077); *see also* Dec. 12, 2012 Tr. at 4186:4-8 (Doutt).

[52] NRC Staff Testimony at 16 (A16) (NRC000077).

intended functions of the cables within the scope of the Inaccessible Cable Program will be maintained consistent with the current licensing basis ("CLB") for the PEO.[53]

27. Entergy also developed a fleet-wide procedure to implement the Inaccessible Cable Program – EN-DC-346, "Cable Reliability Program."[54] In developing EN-DC-346, Entergy took current Nuclear Energy Institute ("NEI") and EPRI industry guidance, as well as applicable and Institute of Electrical and Electronics Engineers ("IEEE") standards, into account.[55] As described further below, EN-DC-346 requires Entergy to identify all medium- and low-voltage cables that are within the scope of the IPEC Inaccessible Cable Program, along with their functions and physical characteristics.[56] In addition, the procedure also mandates periodic actions to prevent cables from being exposed to significant moisture, such as inspecting cable manholes to identify water accumulation and removing water if needed.[57] EN-DC-346 also identifies the methods Entergy will use to test its cables, the acceptance criteria, and the testing frequency.[58]

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53 *Id.* Each nuclear power plant has a CLB, a term of art encompassing the various Commission requirements applicable to a specific plant that are in effect at the time of the license renewal application. The CLB represents an "evolving set of requirements and commitments for a specific plant that are modified as necessary over the life of a plant to ensure continuation of an adequate level of safety." Final Rule, Nuclear Power Plant License Renewal; Revisions, 60 Fed. Reg. 24,461, 22,473 (May 8, 1995).

54 Entergy Testimony at 37 (A59) (ENTR00233); Dec. 12, 2012 Tr. at 4074:10-14 (Cox). The current version of the procedure is EN-DC-346, Rev. 3, Cable Reliability Program (Apr. 30, 2012) ("EN-DC-346") (ENT000583).

55 *See* Entergy Testimony at 37-38 (A60) (ENTR00233). Key guidance documents used to develop the procedure include: NEI 06-05, Medium Voltage Underground Cable White Paper (Apr. 2006) ("NEI 06-05") (ENT000234); EPRI 1021070, Rev. 1, Medium Voltage Cable Aging Management Guide (Dec. 2010) (ENT000238); EPRI 1020805, Plant Support Engineering: Aging Management Program Guidance for Medium-Voltage Cable Systems for Nuclear Power Plants (June 2010) (NYS000158); EPRI 1020804, Plant Support Engineering: Aging Management Program Development Guidance for AC and DC Low-Voltage Power Cable Systems for Nuclear Power Plants (June 2010) ("EPRI 102804") (ENT000240).

56 *See* EN-DC-346 at 18 (ENT000583).

57 *Id*. at 22.

58 *Id*. at 18-22.

28. Based on the Staff's audit and review of the Cables and Connections Program, the Staff found that the program was consistent with Section XI.E1 of the GALL Report, Rev. 1.[59] The Staff concluded that Entergy had demonstrated that the effects of aging will be adequately managed so that the in-scope cables' functions will be maintained consistent with the CLB for the PEO.[60] As such, Entergy did not revise the scope of the Cables and Connections Program following the submission of the IPEC LRA.

29. To implement the Cables and Connections Program, Entergy developed procedure EN-DC-348, "Non-EQ Insulated Cables and Connections Inspection."[61] EN-DC-348 takes into account Entergy's initial licensing requirements and license renewal commitments, NRC regulations and guidelines, industry guidelines published by EPRI and IEEE, operating experience with plant cables, and cable manufacturer recommendations.[62]

C. The Parties' Pre-filed Written Testimony

30. On December 15, 2011, New York filed its initial statement of position, the prefiled testimony of Earle C. Bascom III, and several exhibits related to NYS-6/7, including a report prepared by Mr. Bascom.[63] In its position statement, New York argued that Entergy failed to provide an adequate and specific program to manage the effects of aging on non-EQ

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59 NRC Audit Report at 27-28 (ENT000041); SER at 3-38 (NYS00326B).

60 SER at 3-38 (NYS00326B).

61 Entergy Testimony at 16 (A29) (ENTR00233); EN-DC-348, Rev. 2, Non-EQ Insulated Cables and Connections Inspection (July 5, 2011) ("EN-DC-348") (ENT000241).

62 Entergy Testimony at 48 (A78) (ENTR00233). Key guidance documents used to develop the procedure include: EPRI 1020804 (ENT000240) and EPRI TR-109619, Guidelines for the Management of Adverse Localized Equipment Environments (June 1999) (ENT000239).

63 *See* State of New York's Initial Statement of Position, Contentions NYS-6 and 7 (Dec. 15, 2011) ("New York Position Statement") (NYS000135); Prefiled Written Testimony of Earle C. Bascom III Regarding Contentions NYS-6 and 7 ("New York Direct Testimony") (NYS000136); Report of Earle C. Bascom III, P.E. in Support of Contentions NYS-6 and 7 (Dec. 13, 2011) (NYS000138).

inaccessible low- and medium-voltage power cables that are exposed to adverse localized environmental conditions, such as significant moisture and excessive heat.[64]

31. On March 29, 2012, Entergy filed its statement of position[65] and the testimony of Alan B. Cox, Roger B. Rucker, Thomas S. McCaffrey, and Howard G. Sedding.[66] In its position statement, Entergy argued that: (1) LRA Section B.1.23, as amended to include both low- and medium-voltage cables, sufficiently describes Entergy's Inaccessible Cable Program and is consistent with the AMP for such cables recommended in Revision 1 of the GALL Report and meets the intent of Revision 2 of the GALL Report; and (2) IPEC's Inaccessible Cable Program meets all regulatory requirements, includes the requisite level of detail, and is being implemented in accordance with Entergy's regulatory commitments.[67]

32. The NRC Staff also filed its statement of position[68] and the testimony of Cliff Doutt and Duc Nguyen.[69] In its position statement, the Staff asserted that: (1) Entergy's LRA demonstrates that the effects of aging on the functionality of medium- and low-voltage non-EQ inaccessible cables will be adequately managed during the period of extended operations as required by 10 C.F.R. § 54.21(a)(1); and (2) New York has failed to provide facts supporting the contention that the AMP described in the LRA is insufficient, and that additional activities should be specified.[70]

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64 New York Position Statement at 1 (NYS000135).

65 Entergy's Statement of Position Regarding Contentions NYS-6/NYS-7 (Non-EQ Inaccessible Medium- and Low-Voltage Cables) (Mar. 29, 2012) ("Entergy Position Statement") (ENT000232).

66 Entergy Testimony (ENTR00233).

67 Entergy Position Statement at 2-3 (ENT000232).

68 NRC Staff's Statement of Position Regarding NYS 6/7 (Mar. 30, 2012) ("NRC Staff Position Statement") (NRC000076).

69 NRC Staff Testimony (NRC000077).

70 NRC Staff Position Statement at 7-8 (NRC000076).

33. On June 29, 2012, New York submitted a revised position statement[71] and the rebuttal testimony of Mr. Bascom.[72] In rebuttal, New York: (1) acknowledged that Entergy procedure EN-DC-346 contains the details that it had asserted were "missing" from the Inaccessible Cable Program;[73] (2) acknowledged that it no longer challenged the technical adequacy of the Inaccessible Cable Program, as implemented by EN-DC-346, to manage the effects of aging caused by the exposure of cables to significant moisture;[74] and (3) did not challenge Entergy's ability to adequately manage aging of above-ground cables potentially exposed to thermal stress.[75] Therefore, two New York arguments remained: (1) although the Inaccessible Cable Program may be adequate as a technical matter if implemented in accordance with EN-DC-346, Entergy cannot provide reasonable assurance unless the implementation is elevated to a legally binding obligation as a condition on its renewed license; and (2) Entergy had no AMP to adequately manage aging of below-ground cables potentially exposed to thermal stress.[76]

D. Other Prehearing Procedural Matters

34. On August 8, 2012, New York filed a motion with respect to its seven "Track 1" contentions,[77] seeking to invoke its purported statutorily-granted cross-examination rights under

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71 State of New York's Revised Statement of Position Regarding Contentions NYS-6 and NYS-7 (June 29, 2012) ("New York Revised Position Statement") (NYS000410).

72 Pre-filed Written Rebuttal Testimony of Earle C. Bascom III Regarding Contentions NYS-6 and NYS-7 (June 29, 2012) ("New York Rebuttal Testimony") (NYS000411).

73 New York Revised Position Statement at 3 (NYS000410).

74 *Id*. at 3 n.6.

75 *See id*. at 7.

76 *Id*. at 5, 7.

77 Track 1 contentions consist of Riverkeeper TC-2 (Flow-Accelerated Corrosion), NYS-12C (SAMA Analysis – Decontamination Costs), NYS-16B (SAMA Analysis – Population Estimate), NYS-17B (Land Values), NYS-37 (Energy Alternatives), Clearwater EC-3A (Environmental Justice), NYS-5 (Buried Piping), NYS-6/7 (Non-EQ Cables), and NYS-8 (Transformers). Prior to the October 2012 hearings, the parties settled another Track 1 contention, Riverkeeper EC-3/Clearwater EC-1 (Spent Fuel Pool Leaks to Groundwater). The Board

Section 274(*l*) of the Atomic Energy Act ("AEA"), 42 U.S.C. § 2021(*l*).[78] Specifically, New York claimed that as the host state to IPEC, Section 274(*l*) confers upon it expansive cross-examination rights that take precedence over the restrictive cross-examination rights allowed pursuant to 10 C.F.R. §§ 2.315(c) and 2.1204(b)(3).[79] It argued that the 2004 modifications to the NRC's Administrative Procedure Act-compliant regulations, which it contended generally restrict the use of cross-examination by most parties, do "not purport to address the rights preserved to the States in [Section 2021(*l*)]."[80] Thus, New York asserted, 10 C.F.R. §§ 2.135(c) and 2.1204(b)(3) do not apply to it as a host state and do not restrict its right to interrogate witnesses.[81] Both Entergy and the NRC Staff opposed the motion as lacking a legal basis,[82] arguing that New York mischaracterized as an "absolute right" what is actually a "reasonable opportunity" to cross-examine witnesses.[83]

35. On August 29, 2012, in accordance with 10 C.F.R. § 2.1207(a)(3) and the Board's Scheduling Order, Entergy (and the other parties) submitted *in camera* proposed questions for the Board to consider asking to the other parties' witnesses on Contention NYS-6/7.[84]

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approved that settlement agreement on October 17, 2012. Licensing Board Consent Order (Approving Settlement of Consolidated Contention Riverkeeper EC-3 and Clearwater EC-1) (Oct. 17, 2012) (unpublished).

78 State of New York Motion to Implement Statutorily-Granted Cross-Examination Rights Under Atomic Energy Act § 274(*l*) at 1 (Aug. 8, 2012), *available at* ADAMS Accession No. ML12221A483.

79 *Id.* at 14-15, 19.

80 *Id.* at 14.

81 *Id.* at 15.

82 Entergy's Answer Opposing New York State's Motion to Cross-Examine (Aug. 20, 2012) ("Entergy Answer Opposing New York Motion"), *available at* ADAMS Accession No. ML12233A371; NRC Staff's Answer to State of New York's "Motion to Implement Statutorily-Granted Cross-Examination Rights under Atomic Entergy Act § 274(*l*)" (Aug. 20, 2012) ("Staff Answer Opposing New York Motion"), *available at* ADAMS Accession No. ML12233A742.

83 Entergy Answer Opposing New York Motion at 3-4, Staff Answer Opposing New York Motion at 9-10.

84 10 C.F.R. § 2.1207(a)(3)(iii).

36. In an Order issued on September 21, 2012, the Board granted, in part, New York's August 8, 2012 motion for cross-examination of witnesses during the evidentiary hearings.[85] The Board found that New York's opportunity to cross-examine witnesses is bound by the same 10 C.F.R. Part 2 regulations that govern all parties to this proceeding.[86] As a result, the Board found it unnecessary "to address whether and if so to what extent, in some theoretical sense, the right to cross-examination granted to host states by the AEA may be different from those provided to parties under 10 C.F.R. Part 2."[87] Citing 10 C.F.R. § 2.1204(b)(1), the Board noted that in any oral hearing held under Subpart L, a party may file a motion (accompanied by a cross-examination plan) seeking cross-examination by the parties on particular admitted contentions or issues.[88] Pursuant to 10 C.F.R. § 2.1204(b)(3), the presiding officer may allow cross-examination by the parties "only if the presiding officer determines that cross-examination by the parties is necessary to ensure the development of an adequate record for decision."[89]

37. The Board concluded that New York had complied with 10 C.F.R. § 2.1204(b) by filing the motion for cross-examination and proposed examination questions before the August 29, 2012, deadline for those submittals.[90] Citing the "voluminous and technical" nature of the parties' evidentiary submissions, the Board determined that granting New York's request for cross-examination was necessary to ensure development of an adequate record for this

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85 Licensing Board Order (Order Granting, in part, New York's Motion for Cross Examination) (Sept. 21, 2012) ("Sept. 21, 2012 Order") (unpublished); *see also* Licensing Board Errata (Regarding Order Granting, in part, New York's Motion for Cross Examination) (Sept. 25, 2012) (unpublished).

86 Sept. 21, 2012 Order at 5.

87 *Id.* at 5-6.

88 *Id.* at 6.

89 *Id.* (quoting 10 C.F.R. § 2.1204(b)(3)).

90 *Id.*

proceeding.[91] It thus ruled that during the hearing, New York could examine witnesses following the Board's examination, as long as its questions were "relevant, reasonable, and non-repetitive."[92]

38. On September 24, 2012, the Board discussed its Order in a pre-hearing conference call in response to questions from the NRC Staff and Entergy.[93] During that conference, Chairman McDade confirmed that New York would have the opportunity to examine witnesses on "areas that the Board missed" in its own witness examinations.[94] He also suggested that the Board might limit New York's questioning if it becomes repetitive[95] and stated that other parties would have a reasonable opportunity to interrogate witnesses on discrete issues through oral motions at the hearing if they made a "sufficiently compelling request" and avoided repetitive questions.[96]

39. Subsequently, Entergy filed an emergency petition for interlocutory review of the Board's order with the Commission.[97] Entergy requested, and was granted, expedited briefing on its petition.[98] New York opposed Entergy's petition[99] and the Staff supported it.[100]

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91 *Id.*

92 *Id.* at 6-7.

93 Official Transcript of Proceedings, Indian Point Nuclear Generating Units 1 & 2 [sic—2 & 3] (Sept. 24, 2012).

94 *Id.* at 1238:1-6 (Judge McDade)

95 *Id*.

96 *Id*. at 1239:21-1241:8 (Judge McDade).

97 Entergy's Emergency Petition for Interlocutory Review of Board Order Granting Cross-Examination to New York State and Request for Expedited Briefing (Sept. 28, 2012), *available at* ADAMS Accession No. ML12272A363.

98 *Id.*; Commission Order (Oct. 2, 2012) (unpublished).

99 State of New York Combined Opposition to Entergy's Requests for Emergency Stay and Interlocutory Review of the Board Order Granting Limited Cross Examination (Oct. 1, 2012), *available at* ADAMS Accession No. ML12275A327. Entergy replied in opposition to New York's answer. *See* Entergy's Reply to New York State's Opposition to Entergy's Emergency Petition for Interlocutory Review (Oct. 8, 2012), *available at* ADAMS Accession No. ML12282A002.

40. On October 12, 2012, the Commission issued an Order denying Entergy's request for interlocutory review, noting that the Board has the responsibility in the first instance to oversee the development of an adequate case record.[101] In so ruling, the Commission cited Chairman McDade's assurances, made during the September 24, 2012 prehearing conference call, that the Board would prohibit open-ended, lengthy, repetitive, and immaterial cross-examination, and allow all parties a full and fair opportunity to request cross-examination.[102] The Commission further stated its expectation that the Board would act on cross-examination requests fairly and evenhandedly, rigorously oversee any cross-examination it allowed, and limit the cross-examination to "supplemental and genuinely material inquiries, necessary to develop an adequate and fair record."[103]

41. During the hearing on the first contention (Riverkeeper TC-2), the Board indicated that it would allow questioning of the witnesses by the petitioner (there, Riverkeeper, Inc. ("Riverkeeper")), Entergy, and the NRC Staff.[104] Entergy objected to examination of witnesses by any party, and requested that the Board close the record on that contention.[105] In support of its position, Entergy: (1) noted that Riverkeeper had not made, nor been required to make, the sort of showing contemplated by the Subpart L regulations, which was a circumstance that the Commission had found "troubling"; (2) argued that no sufficient constraints had been placed on examination by parties; (3) noted that the procedure, rather than constituting the "rare

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100 NRC Staff's Answer to Entergy's Emergency Petition for Interlocutory Review, and Application for Stay, of the Board's Order of September 21, 2012 (Oct. 5, 2012), *available at* ADAMS Accession No. ML12279A309.

101 *Entergy Nuclear Generation Co.* (Indian Point Nuclear Generating Units 2 & 3) CLI-12-18, 76 NRC __ slip op. at 6 (Oct. 12, 2012).

102 *Id*. at 3-4.

103 *Id*. at 7.

104 Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 at 1797:16-24 (Oct. 17, 2012) (Judge McDade).

105 *Id.* at 1794:11-1797:15 (Fagg).

occurrence" contemplated by the Commission, was apparently being undertaken as the norm for these proceedings; and (4) argued that, with two full days of Board questioning, additional questioning by the parties was not "truly necessary," as mandated by the Commission.[106] In the alternative, Entergy requested reciprocal treatment; *i.e.,* that it be afforded the same direct and cross-examination rights as the other parties.[107]

42. The Board denied Entergy's motion to preclude party examination of witnesses, stating any additional showing need not be articulated, and that the Board envisioned allowing Riverkeeper, then Entergy, and then the Staff brief opportunities to conduct limited interrogation of the witnesses.[108] During the hearing on the second contention (NYS-12C), Entergy reiterated its objection, which was overruled by the Board, and Entergy asked that the Board recognize Entergy's standing objection on such grounds with respect to all remaining contentions.[109] Upon that basis, Entergy rested upon its standing objection and did not repeat its procedural arguments in connection with NYS-6/7 or subsequent contentions.

E. The December 12, 2012 Evidentiary Hearing

43. On October 15, 2012, the Board commenced its evidentiary hearing and admitted into evidence the testimony and exhibits offered by the parties.[110] On December 12, 2012, the Board held the evidentiary hearing on NYS-6/7 at the DoubleTree Hotel in Tarrytown, New York.[111]

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106 *Id.*

107 *Id.* at 1797:8-14 (Fagg).

108 *Id.* at 1797:16-1800:10 (Judge McDade).

109 Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 at 2315:17-2316:2 (Oct. 18, 2012) (Bessette).

110 Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 at 1268:21-1272:6 (Oct. 15, 2012) (Judge McDade).

111 Dec. 12, 2012 Tr. at 3985:3-6 (Judge McDade).

44. The Board conducted the hearing in accordance with the provisions of Subpart L to 10 C.F.R. Part 2. In accordance with its September 21, 2012 Order, and the Commission's related guidance in CLI-12-18, the Board permitted limited cross-examination and redirect examination by all parties. Thus, during the hearings, the witnesses responded principally to questions from the Board and, to a lesser extent, to questions posed by counsel. The hearing on NYS-6/7 concluded on December 12, 2012.

45. Following the hearing, on January 11, 2013, Entergy and New York filed a Joint Motion for Leave to File Additional Hearing Exhibits for Admission into Evidence, seeking the admission of several new exhibits related to NYS-6/7 (among other contentions).[112] The Board admitted those exhibits into evidence by Order dated January 15, 2013.[113]

46. The parties jointly submitted proposed corrections to the hearing transcript on February 5, 2013.[114] On February 28, 2013, the Board issued an Order adopting the parties' proposed transcript corrections.[115]

47. On March 22, 2013, the parties submitted proposed findings of fact and conclusions of law in the form of a proposed Initial Decision by the Board.

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112 Entergy and the State of New York Joint Motion for Leave to file Additional Hearing Exhibits (Jan. 11, 2013), *available at* ADAMS Accession No. ML13011A396.

113 Licensing Board Order (Scheduling Post-Hearing Matters and Ruling on Motions to File Additional Exhibits) at 5 (Jan. 15, 2013) (unpublished).

114 Letter from Counsel for Entergy Nuclear Operations, Inc., Counsel for Riverkeeper, Inc., Counsel for the State of New York, Counsel for the NRC Staff, and Counsel for Hudson [River] Sloop Clearwater, Inc., to Lawrence G. McDade, Chairman, Dr. Michael F. Kennedy, and Dr. Richard Wardwell, Atomic Safety and Licensing Board (Feb. 5, 2013), *available at* ADAMS Accession No. ML13036A437.

115 Licensing Board Order (Adopting Proposed Transcript Corrections and Resolving Contested Corrections) (Feb. 28, 2013) (unpublished).

III. APPLICABLE LEGAL AND REGULATORY STANDARDS

A. Scope of License Renewal Review Under 10 C.F.R. Part 54

48. In the context of license renewal, the Commission has specifically limited its safety review of LRAs to the matters specified in 10 C.F.R. §§ 54.21 and 54.29(a)(2), which focus on the aging management of certain SSCs.[116] The Commission's license renewal regulations reflect the distinction between 10 C.F.R. Part 54 aging management issues on the one hand, and ongoing 10 C.F.R. Part 50 regulatory process (*e.g.*, security and emergency planning issues) on the other.[117] The NRC's longstanding regulatory framework is premised upon the conclusion that, with the exception of aging management issues, the NRC's ongoing regulatory process is adequate to ensure that the CLB of an operating plant provides and maintains an acceptable level of safety.[118]

49. Consequently, the matters before the Board in this proceeding are limited to whether IP2 and IP3 can be safely operated *in the PEO*, that is, beyond the current expiration of the licenses in 2013 and 2015, respectively.[119] Issues regarding the adequacy of the design and construction of the facility are, therefore, outside the scope of matters appropriately considered here.[120]

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116 *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), CLI-01-17, 54 NRC 3, 7-8 (2001); *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2), CLI-02-26, 56 NRC 358, 363 (2002).

117 *Turkey Point*, CLI-01-17, 54 NRC at 7.

118 *See* Final Rule, Nuclear Power Plant License Renewal; Revisions, 56 Fed. Reg. 64,943, 64,946 (Dec. 13, 1991).

119 *Turkey Point*, CLI-01-17, 54 NRC at 8.

120 In that regard, when the Commission issues an initial license, it makes a "comprehensive determination that the design, construction, and proposed operation of the facility satisfied the Commission's requirements and provided reasonable assurance of adequate protection to the public health and safety and common defense and security." Final Rule, Nuclear Power Plant License Renewal; Revisions, 56 Fed. Reg. at 64,947.

B. Reasonable Assurance Standard

50. For safety issues, pursuant to 10 C.F.R. § 54.29(a), the NRC will issue a renewed license if it finds that actions have been identified and have been or will be taken by the applicant, such that there is *reasonable assurance* that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB.

51. Longstanding Commission and judicial precedent makes clear that the reasonable assurance standard does not require an applicant to meet an "absolute" or "beyond a reasonable doubt" standard.[121] Rather, the Commission evaluates an application on a case-by-case approach, applying sound technical judgment and verifying the applicant's compliance with Commission regulations.[122] A "touchstone" for determining whether the reasonable assurance standard is satisfied is compliance with Commission regulations.[123]

52. Commission precedent also makes clear that the reasonable assurance standard does not require an applicant to show that aging effects are precluded.[124] Rather, the regulatory requirement is to "adequately manage" aging effects.[125]

C. Demonstration of Reasonable Assurance Through Consistency with the GALL Report

53. The NRC Staff verifies compliance with the NRC's license renewal regulations through its comprehensive LRA review process, which includes, among other things, review of

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121 *AmerGen Energy Co. LLC* (Oyster Creek Generating Station), CLI-09-7, 69 NRC 235, 263-64 (2009), *aff'd sub nom. N.J. Envtl. Fed'n v. NRC*, 645 F.3d 220 (3d Cir. 2011); *Commonwealth Edison Co.* (Zion Station, Units 1 & 2), ALAB-616, 12 NRC 419, 421 (1980); *N. Anna Envtl. Coal. v. NRC*, 533 F.2d 655, 667-68 (D.C. Cir. 1976) (rejecting the argument that reasonable assurance requires proof beyond a reasonable doubt and noting that the licensing board equated "reasonable assurance" with "a clear preponderance of the evidence").

122 *See Oyster Creek*, CLI-09-7, 69 NRC at 263; *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC 449, 465-66 (2010).

123 *See Me. Yankee Atomic Power Co.* (Me. Yankee Atomic Power Station), ALAB-161, 6 AEC 1003, 1009 (1973).

124 *See NextEra Energy Seabrook, LLC (*Seabrook Station, Unit 1), CLI-12-05, 75 NRC __, slip op. at 17 (Mar. 8, 2012).

125 *See id*. (emphasis omitted).

the LRA and final safety analysis report ("FSAR") supplement, the issuance of RAIs, the conduct of onsite audits and inspections, and the preparation of a detailed safety evaluation report. The NRC Staff also reviews an LRA against the requirements set forth in 10 C.F.R. Part 54, as well as Staff guidance contained in NUREG-1800, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants.[126]

54. As mentioned previously, the GALL Report provides the technical basis for NUREG-1800 and identifies AMPs that the Staff has accepted as meeting the requirements of Part 54.[127] For each AMP, the GALL Report describes ten program elements that the Staff evaluates: (1) Scope of the Program; (2) Preventive Actions; (3) Parameters Monitored or Specified; (4) Detection of Aging Effects; (5) Monitoring and Trending; (6) Acceptance Criteria; (7) Corrective Actions; (8) Confirmation Process; (9) Administrative Controls; and (10) Operating Experience.[128]

55. As noted in the guidance, the GALL Report is treated in the same manner as an NRC-approved topical report that is generically applicable.[129] Therefore, an applicant may reference the GALL Report in an LRA to demonstrate that its aging management programs correspond to those that the NRC staff previously reviewed and approved in the GALL Report.[130] As the Staff has indicated, adherence to GALL Report guidance thus constitutes one acceptable way to manage aging effects for license renewal.[131]

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126 NUREG-1800, Rev. 1, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, (Sept. 2005) ("NUREG-1800") (NYS000195).

127 GALL Report, Rev. 2 at 8 (NYS00147A).

128 *Id*. at 6.

129 *Id*. at 8.

130 *Id*.

131 *Id*; Dec. 12, 2012 Tr. at 4024:12-17 (Doutt) ("But if they're consistent with GALL Rev 1 and GALL Rev 2, whatever the case may be, the license applicant who commits to implement these AMPs is consistent with the corresponding AMP in GALL which is what our audit is intending to do. That provides us the reasonable

56. The Commission confirmed this approach in *Oyster Creek*: A "license renewal applicant's use of an aging management program identified in the GALL Report *constitutes reasonable assurance* that it will manage the targeted aging effect during the renewal period."[132] In *Oyster Creek*, the Commission "expressly interpreted section 54.21(c)(1) to permit a demonstration [that the aging effects will be adequately managed for the period of extended operation] *after* the issuance of a renewed license."[133] Accordingly, as the Commission reiterated in *Vermont Yankee*, "a commitment to implement an AMP that the NRC finds is consistent with the GALL Report constitutes one acceptable method for compliance with 10 C.F.R. § 54.21(c)(1)(iii)."[134]

57. Because adherence to the GALL Report constitutes an acceptable way to manage aging effects for license renewal,[135] it is acceptable and, in fact, standard practice for an applicant to refer to information in the GALL Report, and there is no need to repeat that same GALL Report information in the LRA.[136]

58. The Staff's evaluation of an applicant's proposed AMPs against the AMPs described in the GALL Report is a long-standing, well-established process. The nearly 40

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assurance."). Although the GALL Report is a guidance document, it is entitled to special weight. *NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-05, 75 NRC __, slip op. at 16 n.78 (Mar. 8, 2012) (quoting *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-01-22, 54 NRC 255, 264 (2001)).

132 *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC 461, 468 (2008) (emphasis added); *see also Seabrook*, CLI-12-05, slip op. at 18.

133 *Entergy Nuclear Vt. Yankee, L.L.C* (Vt. Yankee Nuclear Power Station), CLI-10-17, 72 NRC 1 at 36 (2010) (citing *Oyster Creek*, CLI-08-23, 68 NRC at 468) (emphasis in original)).

134 *Id.*

135 *Id.* at 37.

136 *Id.* at 37 n.204 ("A license renewal application may reference the GALL Report to demonstrate that the applicant's AMP corresponds to one that has been reviewed and approved in that Report.").

license renewal applications that have been submitted and approved since the issuance of the original GALL Report in July 2001 have undergone the same review process.[137]

D. Demonstration of Reasonable Assurance Through Licensee Commitments

59. The demonstration of reasonable assurance through the identification of future actions (*i.e.*, commitments) is a bedrock principle of the license renewal process in 10 C.F.R. Part 54. Licensee commitments are a well-established and essential mechanism for ensuring that licensees implement their AMPs in a timely and effective manner.[138] This principle dates back to the original 1991 license renewal rule, in which the Commission specified that the license renewal process would rely on *new commitments* to monitor, manage, and correct age-related degradation.[139] Accordingly, it is permissible for an applicant to incorporate commitments in its LRA, and for the Staff to review and rely on such commitments in making its reasonable assurance determination.[140]

60. Commitments are tracked by licensees and monitored and inspected by the NRC Staff. This applies equally to commitments made during current operation under Part 50 or made for license renewal under Part 54. Once a renewed license is issued, license renewal commitments become part of the CLB, which is enforced by the NRC under its ongoing Part 50 oversight process.[141] The licensing basis for a nuclear power plant during the renewal term will consist of the CLB and new commitments to monitor, manage, and correct age-related degradation unique to license renewal, as appropriate.[142]

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137 *See* Status of License Renewal Applications and Industry Activities, *available at* .

138 *See Vermont Yankee,* CLI-10-17, 72 NRC at 37.

139 *See* Final Rule: Nuclear Power Plant License Renewal, 56 Fed. Reg. at 64,946.

140 *See Vt. Yankee*, CLI-10-17, 72 NRC at 37.

141 *See* 10 C.F.R. §§ 54.3, 54.33.

142 Final Rule; Nuclear Power Plant License Renewal, 56 Fed. Reg. at 64,946.

61. With respect to licensee commitments, the Commission has "long declined to assume that licensees will refuse to meet their obligations," given that licensees remain subject to continuing NRC oversight, inspection, and enforcement authority throughout the operating license term.[143] In that regard, the NRC Staff continuously inspects and enforces licensee commitments, including license renewal commitments, as part of its ongoing regulatory oversight process under 10 C.F.R. Part 50—"separate and apart" from its review of an LRA.[144] Further, the license renewal process is premised on the assumption that the NRC Staff will adequately perform its oversight functions.[145] Accordingly, any question as to the adequacy of the NRC Staff's oversight and enforcement activities with respect to commitments is outside the scope of this proceeding.[146]

E. Burden of Proof

62. At the hearing stage, an intervenor has the initial "burden of going forward," *i.e.*, it must provide sufficient evidence to support the claims made in the admitted contention.[147] The

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143 *See, e.g., Pac. Gas & Elec. Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), CLI-03-2, 57 NRC 19, 29 (2003) (in denying a petition to intervene, the Commission held that the intervenor had not provided "any reason (via submission of facts or expert opinion)" to believe that the licensee would fail to meet its regulatory obligations).

144 *Oyster Creek*, CLI-09-7, 69 NRC at 284 (holding that review of the applicant's compliance with a commitment to perform a finite element structural analysis of the drywell was not a precondition for granting the renewed operating license); *see also id*. ("[R]eview and enforcement of license conditions is a normal part of the Staff's oversight function rather than an adjudicatory matter.").

145 *See Turkey Point*, CLI-01-17, 54 NRC at 9 (holding that just as "oversight programs help ensure compliance with the current licensing basis during the original license term, they likewise can reasonably be expected to fulfill this function during the renewal term").

146 *Id.* at 10 ("Adjudicatory hearings in individual license renewal proceedings will share the same scope of issues as our NRC staff review, for our hearing process (like our staff's review) necessarily examines only the questions our safety rules make pertinent.").

147 *Oyster Creek*, CLI-09-7, 69 NRC at 269 (quoting *Consumers Power Co*. (Midland Plant, Units 1 & 2), ALAB-123, 6 AEC 331, 345 (1973)) ("The ultimate burden of proof on the question of whether the permit or license should be issued is . . . upon the applicant. But where . . . one of the other parties contends that, for a specific reason . . . the permit or license should be denied, that party has the *burden of going forward* with evidence to buttress that contention. Once he has introduced sufficient evidence to establish a *prima facie* case, the burden then shifts to the applicant who, as part of his overall burden of proof, must provide a sufficient rebuttal to satisfy the Board that it should reject the contention as a basis for denial of the permit or license.") (emphasis in original); *see also Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 554 (1978)

mere admission of the contention does not satisfy that burden. Moreover, an intervenor cannot meet its burden by relying on unsupported allegations and speculation.[148] Rather, it must introduce sufficient evidence during the hearing phase to establish a *prima facie* case.[149] If it does so, then the burden shifts to the applicant to provide sufficient evidence to rebut the intervenor's contention.[150]

63. Ultimately, a preponderance of the evidence must support the applicant's position.[151]

IV. FACTUAL FINDINGS AND LEGAL CONCLUSIONS

A. Witnesses and Evidence Presented

1. Entergy's Expert Witnesses

64. Entergy presented four witnesses who submitted direct testimony and testified at the evidentiary hearing regarding Contention NYS-6/7: (1) Mr. Alan B. Cox; (2) Mr. Thomas S. McCaffrey; (3) Mr. Roger B. Rucker; and (4) Dr. Howard G. Sedding.

65. Mr. Cox is Entergy's Technical Manager, License Renewal.[152] He has more than 34 years of experience in the nuclear power industry, having served in various positions related

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(upholding this threshold test for intervenor participation in licensing proceedings); *Phila. Elec. Co.* (Limerick Generating Station, Units 1 & 2), ALAB-262, 1 NRC 163, 191 (1975) (holding that the intervenors had the burden of introducing evidence to demonstrate that the basis for their contention was more than theoretical).

148 *See Oyster Creek*, CLI-09-7, 69 NRC 268-70; *see also Phila. Elec. Co.* (Limerick Generating station, Units 1 & 2), ALAB-857, 25 NRC 7, 13 (1987) (stating that an intervenor may not merely assert a need for more current information without having raised any questions concerning the accuracy of the applicant's submitted facts).

149 *See Oyster Creek*, CLI-9-07, 69 NRC at 268-70.

150 *See, e.g.*, 10 C.F.R. § 2.325; *La. Power & Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1093 (1983) (citing *Midland*, ALAB-123, 6 AEC at 345).

151 *See Pac. Gas & Elec. Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-763, 19 NRC 571, 577 (1984). A preponderance of the evidence "requires the trier of fact to believe that the existence of a fact is more probable than its nonexistence." *Concrete Pipe & Products of Cal., Inc. v. Construction Laborers Pension Trust for Southern Cal.*, 508 U.S. 602, 622 (1993) (internal quotation marks and citation omitted).

152 Mr. Cox's professional qualifications are provided in his statement of qualifications and summarized in his testimony. *See* Entergy Testimony at A2-4 (ENTR00233); *Curriculum Vitae* for Alan B. Cox (ENT000031).

to nuclear power plant engineering and operations. Mr. Cox was directly involved in preparing the IPEC LRA and in developing or reviewing AMPs for IP2 and IP3, including the Inaccessible Cable Program and the Cables and Connections Program. He also was directly involved in developing or reviewing Entergy responses to NRC Staff RAIs concerning the LRA and revisions to the application, principally as they relate to aging management issues. In addition, Mr. Cox has been a member of the NEI License Renewal Task Force since approximately 2002 and has previously represented Entergy on the NEI License Renewal Mechanical Working Group and the NEI License Renewal Electrical Working Group. Mr. Cox holds a Bachelor of Science ("B.S.") degree in Nuclear Engineering from the University of Oklahoma and a Masters of Business Administration ("M.B.A.") degree from the University of Arkansas at Little Rock.

66. Mr. McCaffrey is employed by Entergy as the Design Engineering Manager at IPEC.[153] In that capacity, he manages the design engineering staff that maintains the IP2 and IP3 design bases and performs plant modifications for the station. Mr. McCaffrey has approximately 20 years of work experience, most of which has been in the nuclear power industry. He is a licensed Professional Engineer in the State of New York. At IPEC, Mr. McCaffrey has held various positions, including: Electrical System Engineer, Electrical/Instrument and Control ("I&C") Systems Supervisor, and Systems Manager. From 2005 to 2007, Mr. McCaffrey worked at the Institute of Nuclear Power Operations reviewing nuclear power plant equipment performance. Mr. McCaffrey holds a Bachelor of Engineering degree in Electrical Engineering from the State University of New York – Maritime College.

67. Mr. Rucker is an independent Engineering Consultant in Russellville, Arkansas, who focuses on electrical and I&C applications in nuclear power plants, particularly as they

[153] Mr. McCaffrey's professional and educational qualifications are provided in his statement of qualifications and summarized in his written testimony. Entergy Testimony at 5-6 (A10-12) (ENTR00233); *Curriculum Vitae* for Thomas S. McCaffrey (ENT000095).

relate to license renewal.[154] He is a licensed Professional Engineer in the State of Arkansas with over 22 years of experience, most of which has been in the nuclear power industry. Mr. Rucker is familiar with the Inaccessible Cable Program and the Cables and Connections Program and has prepared several documents that support the IPEC LRA, including the electrical aging management review report, as well as the electrical portions of the: (1) AMP evaluation report, (2) scoping and screening report, and (3) operating experience review reports. He has also performed cable inspections at IPEC. He is Entergy's representative for the NEI License Renewal Electrical Working Group. Previously, Mr. Rucker was a member of NEI, EPRI, and IEEE groups involved in license renewal and aging activities, such as the NEI Medium Voltage Cable Task Force, the NEI License Renewal Task Force, the EPRI cable users group, and the IEEE Standards Association. In addition, Mr. Rucker had a lead or contributing role in preparing several industry guidance documents related to cables.[155] Mr. Rucker holds a B.S. degree in Electrical Engineering from the University of Arkansas.

68. Dr. Sedding is employed as the Department Manager, Electrical Safety & Testing by Kinectrics Inc. in Toronto, Canada.[156] He has over 28 years of experience related to testing, condition monitoring and assessment of insulation materials, including extruded and laminar dielectric power cables used by the electrical generating, transmission, and distribution industries. Dr. Sedding has been involved in, or responsible for, numerous projects related to the

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154 Mr. Rucker's professional and educational qualifications are provided in his statement of qualifications and summarized in his written testimony. Entergy Testimony at 3-4 (A6-8) (ENTR00233); *Curriculum Vitae* for Roger B. Rucker (ENT000092).

155 These documents include: EPRI Report No. 1013475, "Plant Support Engineering: License Renewal Electrical Handbook - Rev. 1 to EPRI Report 1003057" (Feb. 2007); NEI 06-05 (ENT000234); and EPRI Report No. 1020805, "Plant Support Engineering: Aging Management Program Guidance for Medium-Voltage Cable Systems for Nuclear Power Plants" (Jun. 2010) (NYS000158).

156 Dr. Sedding's professional and educational qualifications are provided in his statement of qualifications and summarized in his written testimony. Entergy Testimony at 6-8 (A14-16) (ENTR00233); *Curriculum Vitae* for Howard G. Sedding (ENT000235).

specification, testing, monitoring and maintenance of solid, liquid, and gaseous electrical insulation systems in a wide range of high-voltage electrical equipment. These have included large-scale field projects ranging from commissioning testing of transmission-class cable circuits in Canada, the United States, Mexico, and the Middle East, to the refurbishment of four nuclear power units at Bruce Nuclear Generating Station in Ontario. Dr. Sedding also has been involved in many activities of the IEEE, the International Electrotechnical Commission ("IEC") (a Geneva-based organization that develops worldwide standards for electrical and electronic equipment), and the Conférence Internationale des Grandes Réseaux Electriques ("CIGRE") (a Paris-based organization that provides an international forum for discussing experiences operating large power systems). He was chair of the IEEE Instrumentation and Measurement Society (Toronto Chapter) from 1991 to 1994 and a member of the Administrative Committee of the Dielectrics and Electrical Insulation Society from 1994 to 1999. In 2006, he chaired the IEEE International Symposium on Electrical Insulation, having previously served as the conference's Vice-Chair (2004) and Publication Chair (2000). He is active in many IEEE, IEC, and CIGRE working groups and committees. Dr. Sedding holds a B.S. degree in Electrical and Electronic Engineering from the University of Strathclyde in Glasgow, Scotland; Master of Science degree in Crystallography from the University of London; and a Doctor of Philosophy degree in Electrical Engineering and Applied Physics from Brighton Polytechnic (now the University of Brighton) in Brighton, England.

69. Based on the foregoing and the respective backgrounds and experience of Mr. Cox, Mr. McCaffrey, Mr. Rucker, and Dr. Sedding, the Board finds that all four individuals are qualified to testify as expert witnesses relative to the issues raised in NYS-6/7.

2. NRC Staff's Expert Witnesses

70. NRC Staff presented two witnesses who submitted direct testimony and testified at the evidentiary hearing regarding Contention NYS-6/7: (1) Mr. Clifford K. Doutt; and (2) Mr. Duc T. Nguyen.

71. Mr. Doutt is a Senior Electrical Engineer within the NRC's Office of Nuclear Reactor Regulation, Aging Management of Structures, Electrical, and Systems Branch.[157] He has 33 years of experience in the nuclear power industry, including 22 years with the NRC. Mr. Doutt has obtained significant experience in the areas of I&C, electrical engineering, and regulation of the nuclear industry, including licensing, inspection, and maintenance. Mr. Doutt also has participated on standards committee working groups involved with digital systems, instrumentation setpoints, safety system criteria, and single failure criteria. He has participated in reviews or audits of more than fifteen LRAs, including the IPEC LRA, during which he developed audit reports, authored requests for additional information, and wrote portions of Staff safety evaluation reports. His areas of specialty include the AMPs for cables and connections, inaccessible cables, metal-enclosed buses, fuse holders, electrical cable connections, and EQ programs. He was the Staff's lead for the update to the electrical portion of the GALL Report from Rev. 1 to Rev. 2, which integrated Staff license renewal experience obtained during LRA reviews, audits, inspections, interim staff guidance, industry operating experience, stakeholder comments, and updated standards and guidance. Mr. Doutt holds a B.S. degree in Electrical Engineering Technology from Lake Superior State University.

[157] Mr. Doutt's professional and educational qualifications are summarized in his Statement of Professional Qualifications (NRC000078).

72. Mr. Nguyen is an Electrical Engineer within the NRC's Office of Nuclear Reactor Regulation, Aging Management of Structures, Electrical, and Systems Branch.[158] He has 22 years of experience in nuclear power industry regulation. Mr. Nguyen has conducted safety review audits for 24 LRAs, including the IPEC LRA. Mr. Nguyen developed interim staff guidance ("ISG") on certain aging management programs, including ISG-2007-02, Change to GALL AMP XI.E6, Electrical Cable Connections Not Subject to Environmental Qualification Requirements. He also assisted in revising the GALL Report from Rev. 1 to Rev. 2 in the areas of aging management reviews ("AMRs"), AMPs, and time limited aging analysis ("TLAA") for electrical and I&C systems. Mr. Nguyen has a B.S. degree in Electrical Engineering from George Washington University.

73. Based on the foregoing, and the respective backgrounds and experience of Mr. Doutt and Mr. Nguyen, the Board finds that these individuals are qualified to testify as expert witnesses relative to the issues raised in NYS-6/7.

3. New York's Expert Witness

74. New York witness Earle C. Bascom, III provided written direct and rebuttal testimony and oral testimony at the evidentiary hearing regarding Contention NYS-6/7.

75. Mr. Bascom is the president and a principal engineer of Electrical Consulting Engineers, P.C. ("ECE").[159] ECE provides engineering consulting services to the electric power industry and focuses on underground transmission and distribution cable systems. ECE's work includes engineering design and analysis for new cable circuits, rating capacity studies, and assessments on existing cable systems. Mr. Bascom has been involved in several research

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158 Mr. Duc's professional and educational qualifications are summarized in his Statement of Professional Qualifications (NRC000079).

159 Mr. Bascom's professional and educational qualifications are summarized in his *curriculum vitae* (NYS000137).

projects for EPRI, including development of the EPRIGEMS® Cable Ampacity Tutorial, Alternative Cable Evaluation program, Power Transformer Analysis (PTLOAD) system, authoring an expert system and reference manual for underground cable fault location, as principal investigator for the UTWorkstation, and developer of the underground and aerial cable models in the Dynamic Thermal Circuit Rating System. He is also a Senior Member of the IEEE, its Power & Energy Society and Standards Association, a voting member of the Insulated Conductors Committee, a member of CIGRÉ and the U.S. representative for Working Group B1.35, and a past member of the National Association of Corrosion Engineers. Mr. Bascom is a registered Professional Engineer in New York, Florida and Texas. He holds an Associate's of Science degree in Engineering Science from Hudson Valley Community College, a B.S. degree and a Master of Engineering degree in Electric Power Engineering from Rensselaer Polytechnic Institute, and an M.B.A. degree from the State University of New York at Albany.

76. Although Mr. Bascom does not appear to have any NRC regulatory or nuclear power plant experience, based on his education and experience, the Board finds him qualified to testify as an expert witness relative to the issues raised in NYS-6/7.

B. <u>Issues to Be Resolved by the Board</u>

77. Ultimately, to resolve this contention, we must determine whether Entergy has taken, or will take, actions necessary to provide reasonable assurance that the effects of aging will be managed for non-EQ inaccessible low- and medium-voltage cables during the PEO. Resolution of that ultimate question requires the Board to address the following issues and specific challenges raised by New York:

- Whether Entergy's Inaccessible Cable Program – either by itself or together with implementing procedure EN-DC-346 and Entergy's license renewal commitments – is sufficiently specific and provides the requisite reasonable assurance that Entergy will manage the aging effects on the affected cables during the PEO;

- Whether there is reasonable assurance that Entergy will adequately manage the aging effects on below-ground cables within the scope of the Inaccessible Cable Program caused by thermal stress;

- Whether there are appropriate processes in place to ensure that Entergy complies with its commitments and internal procedures related to its Inaccessible Cable Program during the PEO; and

- Whether there is reasonable assurance that Entergy will adequately manage the aging effects on above-ground low- and medium-voltage cables within the scope of the Cables and Connections Program.

78. These issues are addressed in turn below. For the reasons discussed below, we resolve each of the issues, and consequently, the ultimate question in Entergy's favor.

C. IPEC's Inaccessible Cable Aging Management Program, Together With Implementing Procedure EN-DC-346 and Entergy's License Renewal Commitments, Are Sufficiently Specific and Provide the Requisite Reasonable Assurance That the Affected Cables Will Perform Their Intended Function During the PEO

79. New York asserts that the Inaccessible Cable Program – by itself – lacks sufficient specificity to demonstrate that the effects of aging will be adequately managed for the PEO, and further alleges that the fact that the Inaccessible Cable Program is consistent with the relevant AMP in the GALL Report does not demonstrate reasonable assurance.[160] Specifically, New York takes the position that IPEC's Inaccessible Cable Program, as described in LRA Section B.1.23, does not: (1) specify the location or number of the relevant cables; (2) identify their function or the criticality of the systems they serve; (3) describe their physical characteristics (*i.e.*, cable lengths, voltage class, and insulation types); (4) explain the corrective actions to take if manhole inspections reveal periodic water accumulation; (5) explain what cable condition monitoring tests it will use; (6) explain the criteria for determining whether a cable

[160] New York Direct Testimony at 5:5-23 (NYS000136); New York Revised Position Statement at 5 (NYS000410).

passes or fails a condition monitoring test; and (7) identify what corrective actions, if any, Entergy will take if a defective cable is found.[161]

80. Entergy and the Staff counter that, under Commission precedent, a license renewal applicant's use of an AMP identified in the GALL Report constitutes reasonable assurance that the applicant will manage the relevant aging effects during the PEO.[162] Entergy further asserts that neither the NRC's regulations nor NRC guidance require the level of detail sought in the AMP by New York.[163] The Staff concurs that such details are not required for the Staff to make a technical judgment on the technical merits of the AMP.[164] Entergy further asserts that, although the details sought by New York are not required to be included in the AMP itself, they are included in Entergy's implementing procedure for the Inaccessible Cable Program.[165]

81. We first address Entergy's and the Staff's threshold argument that an applicant's reliance on a GALL Report AMP constitutes the requisite reasonable assurance, before turning to New York's argument that the Inaccessible Cable Program lacks sufficient specificity.

1. The Inaccessible Cable Program Described in the IPEC LRA is Consistent with the Relevant GALL Report AMP

82. As noted above, the Inaccessible Cable Program is described in Section B.1.23 of the IPEC LRA.[166] As Entergy witnesses Mr. Cox and Mr. Rucker testified, in preparing the

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161 New York Direct Testimony at 5:5-23 (NYS000136).

162 *See* Entergy Position Statement at 10 (ENT000232); NRC Staff Position Statement at 13 (NRC000076); Dec. 12, 2012 Tr. at 4024:12-17 (Doutt).

163 Entergy Position Statement at 19-20 (ENT000232).

164 NRC Staff Position Statement at 14 (NRC000076).

165 Entergy Position Statement at 21-23 (ENT000232).

166 *See* LRA at B-81 (ENT00015B).

LRA, Entergy followed the GALL Report guidance.[167] Because Entergy submitted its LRA in April 2007, it followed the guidance contained in Revision 1 of the GALL Report, which was the applicable version of the GALL Report at that time.[168] In its LRA, Entergy committed to implementing its new Inaccessible Cable Program in accordance with the corresponding AMP described in Section XI.E3 of the GALL Report without exception.[169]

83. As described above and in the testimony of Staff witnesses Mr. Doutt and Mr. Nguyen, the NRC Staff performed a detailed, independent review of Entergy's Inaccessible Cable Program and the commitments described in LRA Section B.1.23.[170] Following a thorough audit and RAI process, the Staff verified through record reviews and questioning of Entergy personnel that the Inaccessible Cable Program elements were consistent with all ten corresponding GALL Report, Rev. 1, Section XI.E3 program elements.[171] After Entergy revised the Inaccessible Cable Program to include low-voltage cables and other program enhancements, the Staff reviewed the revised program and concluded that it was consistent with the AMP described in Section XI.E3 of Revision 2 of the GALL Report.[172] Based on the program's consistency with the corresponding GALL Report program, the Staff concluded that Entergy had demonstrated that the effects of aging will be adequately managed so that the intended functions of the cables within the scope of the Inaccessible Cable Program will be maintained consistent with the CLB for the PEO.[173]

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167 Entergy Testimony at 34 (A55) (ENTR00233).

168 *Id*. The NRC did not issue Revision 2 of the GALL Report until December 2010. *See* NYS00147A-D.

169 LRA at B-81 (ENT00015B).

170 NRC Staff Testimony at 13 (A14) (NRC000077).

171 *Id*. at 14-15 (A14).

172 *Id*. at 5-6 (A4).

173 *Id.*; SER at 3-31 to -33 (NYS00326B).

84. New York does not dispute that Entergy's description of the Inaccessible Cable Program in the LRA is consistent with the relevant GALL Report AMP description.[174]

85. Accordingly, the Board finds, as an initial matter, that the IPEC Inaccessible Cable Program described in LRA Section B.1.23 is consistent with the AMP described in GALL Report, Rev. 1, Section XI.E3 and that Entergy's expanded Inaccessible Cable Program meets the intent of Section XI.E3 of the GALL Report, Rev. 2.

2. Under Commission Precedent, Entergy's Commitment to Implement an AMP Consistent With GALL Report Section XI.E3 Constitutes Reasonable Assurance That Entergy Will Manage the Relevant Aging Effects

86. In the GALL Report, the NRC Staff indicates that adherence to the report's guidance constitutes one acceptable way to manage aging effects for license renewal.[175] Mr. Doutt confirmed at the hearing that, in the Staff's view, if a license renewal applicant commits to implement an AMP consistent with Section XI.E3 of the GALL Report, "by definition [the applicant has] provided under [10] CFR 54.29 reasonable assurance."[176] As noted above, in its LRA, Entergy committed to implement an Inaccessible Cable Program consistent with Section XI.E3 of the GALL Report.[177]

87. New York acknowledges the Commission's holding in *Oyster Creek* that a "license renewal applicant's use of an aging management program identified in the GALL Report constitutes reasonable assurance that it will manage the targeted aging effect during the renewal period."[178]

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174 *See* New York Revised Position Statement at 5 (NYS000410) (challenging the adequacy of the Inaccessible Cable Program and GALL Report section XI.E3 program, but not the consistency of the two programs).

175 GALL Report, Rev. 1 at 4 (NYS00146A).

176 Dec. 12, 2012 Tr. at 4023:1-4 (Doutt).

177 LRA at B-81 (ENT00015B).

178 New York Position Statement at 6-7 (NYS000135) (quoting *Oyster Creek*, CLI-08-23, 68 NRC at 468).

88. Pursuant to *Oyster Creek*, the Board concludes that, based on its consistency with the AMP described in GALL Report Section XI.E3, the Inaccessible Cable Program described in LRA Section B.1.23 – by itself – provides reasonable assurance that Entergy will manage aging effects on all non-EQ inaccessible low- and medium-voltage cables during the PEO. Although we could end our inquiry there, we also address New York's concern that Entergy's AMP lacks sufficient specificity. Although New York and Mr. Bascom acknowledged that Entergy implementing procedure EN-DC-346 provides the specific program details they believe the Inaccessible Cable Program AMP is lacking,[179] Mr. Bascom testified that it was unclear how the AMP described in the LRA and EN-DC-346 were "directly linked."[180]

89. For the reasons discussed below, we disagree with New York's position that procedure EN-DC-346 is not sufficiently "linked" to Entergy's AMP, although we agree with New York that EN-DC-346 provides sufficiently specific details on how Entergy will implement the Inaccessible Cable Program AMP.

3. Implementing Procedure EN-DC-346 Is Sufficiently "Linked" to Entergy's Inaccessible Cable Program and Contains the Specific Program Details Sought by New York

a. Linkage Between EN-DC-346 and Inaccessible Cable Program

90. Mr. Cox explained that, at the time Entergy submitted its LRA in 2007, Entergy did not have an existing Inaccessible Cable Program at IPEC and had not yet developed procedure EN-DC-346.[181] Therefore, in its LRA Section B.1.23, Entergy made a commitment to

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179 New York Revised Position Statement at 3 (NYS000410); *see also* Dec. 12, 2012 Tr. at 4038:4-7 (Bascom).

180 Dec. 12, 2012 Tr. at 4072:16-19 (Bascom) ("I don't see where that reliability program [EN-DC-346] is directly linked [to] their application.").

181 Dec. 12, 2012 Tr. at 4030:12-14 (Cox).

implement an Inaccessible Cable Program consistent with the AMP described in GALL Report Section XI.E3.[182]

91. During the evidentiary hearing on Contention NYS-5 (Buried Piping and Tanks), Mr. Cox explained the general process Entergy followed to ensure that it satisfied the commitments made in its LRA.[183] Specifically, Mr. Cox testified that Entergy reviewed each element of the relevant GALL Report AMP and then developed and implemented a procedure to ensure that it took the actions specified in each GALL element.[184] With respect to the Inaccessible Cable Program, Mr. Cox testified that Entergy developed EN-DC-346 to ensure that it satisfied the commitment it made in the LRA to implement an AMP consistent with GALL Report Section XI.E3.[185]

92. Accordingly, the Board finds a clear and direct link between the Inaccessible Cable Program described in the LRA and EN-DC-346.

b. Details Regarding IPEC Cables

93. As noted above, Mr. Bascom criticized Entergy's Inaccessible Cable Program because it did not specify the location or number of the relevant cables, identify their function or

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182 *Id*. at 4011:1-3 (Cox) ("[T]his is a new program. So we're basically making a commitment . . . to be consistent with GALL."); *id.* at 4030:14-18 (Cox).

183 On December 10 and 11, 2012 (prior to the December 12 hearing on NYS-6/7), the Board heard testimony on Entergy's license renewal commitments and the enforceability of those commitments in connection with the evidentiary hearing on Contention NYS-5. We have considered that testimony here, to the extent that testimony is generally applicable and relevant to the issues raised in NYS-6/7.

184 Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 at 3355:3-10 (Dec. 10, 2012) (Cox) ("Dec. 10, 2012 Tr.") ("What we would do to verify that we were meeting that commitment, we would go take each element of the GALL report and develop a procedure and implement a procedure that ensured that we followed whatever action was specified by that GALL element. We would do that for each of the ten elements to make sure that we had appropriately implemented the commitment.").

185 Dec. 12, 2012 Tr. at 4030:12-19 (Cox) ("So we put this in as a commitment to have a program that met these elements of the GALL report and [EN-DC-346] was developed subsequent to that to implement the commitment.").

the criticality of the systems they serve, or describe their physical characteristics (*i.e.*, cable lengths, voltage class, and insulation types).[186]

94. As Mr. Cox, Mr. Rucker, and Mr. McCaffrey explained, in accordance with EN-DC-346, Entergy developed a Medium-Voltage In-scope Cable List and a Low-Voltage In-scope Cable List that include the following information for IPEC underground medium-voltage and low-voltage cables: (1) unit; (2) supporting equipment; (3) cable manufacturer; (4) cable insulation type; (5) year of installation; (6) cable length; (7) shielding; (8) number of splices; (9) cable rated voltage; and (10) safety functions.[187] As shown on the lists, nearly all of the underground low- and medium-voltage cables that perform license renewal intended functions are lead-sheathed cables, which, as Entergy's witnesses testified, means that the probability of cable insulation deterioration due to moisture exposure in these cables is very low.[188]

95. At the hearing, Mr. Bascom acknowledged that the scopes of the IPEC Low-Voltage In-Scope Cable List (ENT000242) and the IPEC Medium-Voltage In-Scope Cable List (ENT000243) are adequate.[189] He also agreed that the non-EQ cables at IPEC were lead-sheathed, which he acknowledged "would prevent moisture from getting into the cables."[190] In response to Board questioning, Mr. Bascom indicated that he had no concerns regarding moisture-related cable degradation at IPEC.[191]

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186 New York Direct Testimony at 5:9-12 (NYS000136).

187 *See* EN-DC-346 at 18, 28-31 (ENT000583); IPEC In-Scope Low-Voltage In-Scope Cable List (ENT000242); IPEC Medium-Voltage In-Scope Cable List (ENT000243).

188 Entergy Testimony at 62-63 (A101-02) (ENTR00233); Dec. 12, 2012 Tr. at 4169:1-3 (McCaffrey) ("Lead sheaths are in addition, another barrier we would have for cables, for water intrusion into our cables.").

189 Dec. 12, 2012 Tr. at 4055:24-4056:13 (Bascom).

190 *Id.* at 4172:10-4173:3 (Bascom).

191 *Id.* at 4172:22-4173:3 (Bascom).

96. Therefore, the Board is satisfied that Entergy has provided a sufficient level of detail regarding the functions and characteristics of the cables within the scope of the Inaccessible Cable Program.

c. Corrective Actions

97. Mr. Bascom testified that the Inaccessible Cable Program also was deficient in that it did not identify the corrective actions Entergy will take if manhole inspections reveal periodic water accumulation or what corrective actions, if any, Entergy will take upon discovery of a defective cable.[192]

98. As Mr. McCaffrey testified, the Inaccessible Cable Program and the implementing procedure, EN-DC-346, requires Entergy to take periodic actions to minimize cable exposure to significant moisture.[193] For example, Entergy will inspect IPEC manholes at least once a year, and Entergy will evaluate the manhole inspection results to determine whether the inspection frequency should be modified.[194] In addition, as indicated in Entergy's RAI response, Entergy has committed to performing event-driven inspections of manholes (*e.g.*, following heavy rain or flooding).[195] Mr. McCaffrey testified that if Entergy's manhole inspections indicated the frequent presence of water, then Entergy would increase its inspection frequency to ensure that any water was removed, install a sump pump, or install an alarm to quickly dispatch maintenance workers to remove water.[196] Mr. Cox pointed out that, in fact, Entergy has increased the frequency of its manhole inspections.[197] As Mr. McCaffrey testified,

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192 New York Direct Testimony at 5:12-19 (NYS000136).

193 Dec. 12, 2012 Tr. at 4169:23-4170:3 (McCaffrey).

194 EN-DC-346 at 15, 22-23 (ENT000583).

195 NL-11-032, Attach. 1 at 12 (NYS000151).

196 Dec. 12, 2012 Tr. at 4092:10-20 (McCaffrey).

197 *Id*. at 4092:21-4093:2 (Cox).

Entergy identified the presence of water in IPEC manholes during periodic inspections and entered the condition in the IPEC corrective action program.[198] Under the corrective action program, Entergy evaluated the trend and increased its manhole inspection frequency to ensure that any water, if present, was identified and appropriately removed from the manholes.[199] Mr. Rucker stated that as a result of the identification of this trend through the corrective action program, nearly all of the IPEC manholes are now inspected much more frequently than once per year.[200]

99. Mr. McCaffrey also testified that if an inspection or test revealed an anomaly with a cable, Entergy would enter the condition into its corrective action program, and an engineer would be assigned to evaluate the operability of the cable and determine appropriate corrective action.[201] Potential corrective actions could include increased cable testing, cable repair, or even cable replacement.[202] As discussed in the LRA, Entergy's corrective action program applies to all of IPEC's AMPs, including the Inaccessible Cable Program, during the PEO.[203]

100. Mr. Bascom did not offer any testimony critical of Entergy's corrective action program or proposed corrective actions.

101. The Board finds that Entergy has sufficiently described the corrective actions it will take in the event an anomalous condition is discovered during manhole inspections or cable testing.

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198 *Id*. at 4093:13-18 (McCaffrey).

199 *Id*.

200 *Id*. at 4093:3-6 (Rucker) ("[A]lmost all the manholes that are in process are much more frequent than once per year.").

201 *Id*. at 4090:7-13 (McCaffrey).

202 *Id.* at 4090:13-17 (McCaffrey); *see also* Entergy Testimony at 71-72 (A118) (ENTR00233); EN-DC-346 at §§ 5.4, 5.5, 5.6 (ENT000583).

203 *See* LRA at A-17 (ENT00015B); *see also* Entergy Procedure EN-LI-102, Rev. 17, Corrective Action Process (Dec. 8, 2011) (ENT000249).

d. Cable Testing Methods

102. In his prefiled testimony, Mr. Bascom indicated that the Inaccessible Cable Program was inadequate because it did not identify the cable condition monitoring tests Entergy will use.[204]

103. As stated by Mr. McCaffrey and pursuant to EN-DC-346, all inaccessible low-voltage and medium-voltage cables will be tested for degradation of cable insulation at least once every six years.[205] For medium-voltage cables, EN-DC-346 specifies the use of the "tan delta" and "very low frequency alternating current high potential" (or "VLF AC hipot") tests for shielded medium-voltage cables, based on industry recommendations and operating experience. EN-DC-346 also permits use of other industry-recommended methods for condition monitoring and aging assessment of shielded medium-voltage cables subject to long-term wetting.[206] Further, consistent with the GALL Report, EN-DC-346 permits the use of state-of-the-art methods at the time a specific cable system is tested.[207] At the hearing, Mr. Cox and Mr. Doutt confirmed that Entergy will use a "proven" test (*i.e.*, one that is accepted as a national standard or recommended in industry guidance) to evaluate the insulation integrity of its cables.[208] The specific test could vary, depending on the specific cable and the state-of-the-art at the time the test is conducted during the PEO.[209] For low-voltage cables, EN-DC-346 currently specifies the use of insulation resistance testing.[210]

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204 New York Direct Testimony at 5:14-15 (NYS000136).

205 EN-DC-346 at 21 (ENT000583); Dec. 12, 2012 Tr. at 4087:6-9 (McCaffrey) (confirming the Board's statement that cables will be tested every six years in the PEO).

206 EN-DC-346 at 16-17 (ENT000583); Entergy Testimony at 70 (A113) (ENTR00233).

207 EN-DC-346 at 20 (ENT000583); Entergy Testimony at 70 (A113) (ENTR00233).

208 Dec. 12, 2012 Tr. at 4022:2-5 (Doutt); *id.* at 4028:11-15 (Cox).

209 *Id*. at 4028:13-15 (Cox).

210 Entergy Testimony at 70-71 (A115) (ENTR00233); EN-DC-346 at 21-22 (ENT000583).

104. At the hearing, Mr. Bascom agreed that EN-DC-346 provides adequate specificity regarding the cable testing techniques that Entergy will use at IPEC.[211] IPEC's cable testing techniques are described in EPRI guidance, which Mr. Bascom acknowledged includes an "adequate" and "comprehensive" description of the various testing methods that could be applied.[212] Mr. Bascom also acknowledged that he did not have any issue with the concept of allowing Entergy to use a "state-of-the-art" cable testing technique at the time the testing is performed.[213]

105. Considering the evidence presented, we find that Entergy has identified appropriate cable testing techniques that it may use to test low- and medium-voltage cables in the PEO.

e. Cable Testing Acceptance Criteria

106. Mr. Bascom also was initially critical of the Inaccessible Cable Program because it did not explain the criteria for determining whether a cable passes or fails a condition monitoring test.[214]

107. EN-DC-346, however, identifies test acceptance criteria for both low- and medium-voltage cables.[215] In particular, Mr. Cox, Mr. Rucker, Mr. McCaffrey, and Dr. Sedding pointed to the specific acceptance criteria in Attachments 9.1 and 9.2 of EN-DC-346 for medium- and low-voltage cables.[216] For medium-voltage cables, the procedure sets forth the criteria that would indicate "good insulation condition," "aged insulation condition," and "highly

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211 Dec. 12, 2012 Tr. at 4037:16-19 (Bascom) ("Yes, I mean it does define what tests would be performed.").

212 *Id*. at 4013:18-21 (Bascom).

213 *Id*. at 4012:25-4013:4 (Bascom) ("[O]bviously as an engineer you'd want to consider new technologies that become available.").

214 New York Direct Testimony at 5:15-17 (NYS000136).

215 *See* Entergy Testimony at 71 (A117) (ENTR00233); EN-DC-346 at Attachments 9.1 and 9.2 (ENT000583).

216 Entergy Testimony at 71 (A117) (ENTR00233).

aged insulation condition."[217] For low-voltage cables, EN-DC-346 identifies the acceptable insulation resistance values for particular cable voltage ratings and test voltages.[218]

108. Mr. Bascom did not offer any testimony critical of Entergy's test acceptance criteria.

109. In view of the evidence presented, the Board finds Entergy has identified appropriate and sufficiently detailed test acceptance criteria.

f. Completion of Cable Testing Prior to the Period of Extended Operation

110. In his prefiled testimony, Mr. Bascom suggested that Entergy would not have sufficient time to test all the cables within the scope of the Inaccessible Cable Program before the expiration of the IP2 operating licenses in September 2013.[219]

111. According to Mr. Cox, Mr. Rucker, and Mr. McCaffrey, Entergy will have sufficient time to complete testing of all cables within the scope of the Inaccessible Cable Program before the expiration of the IP2 operating license in September 2013.[220] Mr. McCaffrey confirmed that Entergy has completed testing for the low-voltage cables within the scope of the program and is on track to complete testing of the in-scope medium-voltage cables in the first half of 2013.[221]

112. Mr. Bascom offered no testimony to counter Entergy's testimony on this point.

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217 EN-DC-346, at Attachment 9.1 (ENT000583).

218 *Id.* at Attachment 9.2.

219 New York Direct Testimony at 25:16-26:1 (NYS000136).

220 Entergy Testimony at 72-73 (A120) (ENTR00233).

221 Dec. 12, 2012 Tr. at 4086:21-4087:2 (McCaffrey).

113. Accordingly, the Board credits Entergy witness testimony that it will meet its commitments to test all of the cables within the scope of the Inaccessible Cable Program before the IP2 operating license expires in September 2013.

g. The Essential Elements of EN-DC-346 Have Been Incorporated as Binding and Enforceable License Renewal Commitments

114. The NRC groups licensee commitments into three well-established categories—all of which are enforceable by the NRC:[222]

- *Commitments Captured in License Conditions*. When commitments are written into the renewed license, the commitment ceases to be a commitment and instead becomes a legally binding part of a license. If a licensee fails to meet this obligation, then the NRC can take enforcement action for a direct violation of the license.[223] The terms of a license condition can only be changed through a license amendment.[224] License conditions are reserved for items of high regulatory or safety significance.[225]
- *Commitments Included in the Updated Final Safety Analysis Report ("UFSAR")*. If a licensee fails to comply with a commitment incorporated into the UFSAR, then NRC enforcement action can take two forms. If the failure results in noncompliance with an NRC regulation, then the NRC can issue a notice of violation.[226] If the failure

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222 *See* Letter from Christopher G. Miller, NRC, to Sarah Hofmann, Vermont Department of Public Service, encl. at 1 (Mar. 20, 2012) (NYS000396).

223 *See* 10 C.F.R. § 2.201(a) ("In response to an alleged violation of . . . the conditions of a license . . . , the Commission may serve on the licensee or other person subject to the jurisdiction of the Commission a written notice of violation.").

224 *See* 10 C.F.R. § 50.90.

225 *See* NRR Office Instruction, LIC-105, Rev. 3, Managing Regulatory Commitments Made by Licensees to the NRC at 5 (Mar. 2009) ("LIC-105") (ENT000535).

226 *See* 10 C.F.R. § 2.201(a) (authorizing the issuance of notices of violation for failure to comply with the provisions of "this chapter," *i.e.*, the NRC's regulations in 10 C.F.R.).

does not violate a regulation, then the NRC can issue a notice of deviation.[227] Changes to commitments that have been incorporated into the UFSAR can only be made by a licensee through the regulatory process defined in 10 C.F.R. § 50.59.[228] Licensees can only change commitments in the UFSAR if they meet the criteria in Section 50.59, or, if not, through an NRC-approved license amendment.[229] Changes that licensees make to the UFSAR under Section 50.59 must be documented in records that are subject to NRC inspection and must be reported periodically to the NRC.[230] If the licensee makes a change without complying with the requirements of Section 50.59, then the NRC can issue a notice of violation.[231]

- *Commitments Contained in Docketed Correspondence*. These are commitments made to the NRC in writing, but which are not written in license conditions or in the UFSAR. If a licensee fails to comply with a commitment of this type, then a notice of deviation can be issued by the NRC. Changes made to license renewal commitments that meet the criteria of 10 C.F.R. § 50.59 under the licensee's administrative process are reported to the NRC.[232]

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227 *See* NRC Enforcement Manual, Rev. 7, at 3-26 (Oct. 2010) (ENT000539).

228 *See* 10 C.F.R. § 50.59(c). *See also* Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 at 3646:2-3 (Dec. 11, 2012) (Green) ("Dec. 11, 2012 Tr.") ("[A]ny change[] made to their UFSAR has to go through the 50.59 process.").

229 Dec. 11, 2012 Tr. at 3662:2-9 (Green).

230 *See* 10 C.F.R. § 50.59(d)(2). These reports are submitted on the docket and become available to the public through the NRC's ADAMS system. *See also* Dec. 10, 2012 Tr. at 3335:1-9 (Holston); Dec. 11, 2012 Tr. at 3649:17-20 (Green).

231 Dec. 12, 2012 Tr. at 4190:15-22 (Cox).

232 *See* NEI 99-04, Rev. 0, Guidelines for Managing NRC Commitment Changes at 9-10 (July 1999) (ENT000534).

115. Thus, regardless of how or where a commitment is captured, it is tracked and subject to NRC enforcement if not properly implemented or changed in accordance with the appropriate process.

116. With respect to commitments included in the UFSAR, during the hearing on Contention NYS-5, NRC Staff witness William Holston explained that the Staff takes "the most critical aspects of the [aging management] program and ensure[s] that they are in a document that requires the applicant to take licensing action. And that's the Updated Final Safety Analysis Report . . . . So that's how we assure that going forward into the period of extended operation those most important characteristics of the program are controlled."[233]

117. As Mr. Cox, Mr. Nguyen, and Mr. Doutt testified, the essential elements of EN-DC-346 have been included in the IPEC UFSAR Supplement, and therefore, are binding and enforceable commitments.[234] Specifically, through the RAI process, Entergy committed to: (1) increase the scope of the Inaccessible Cable Program by including low-voltage cables; (2) increase the scope of the AMP by removing the "significant voltage exposure" (*i.e.*, exposure to system voltage for more than 25% of the time) criterion for medium-voltage cables; (3) increase the performance of manhole inspections to at least annually; (4) test for insulation degradation at least once every six years; (5) perform event-driven manhole inspections following events such as heavy rain or flooding; (6) review cable test results to determine the need for more frequent testing; and (7) review manhole inspection results to determine the need for more frequent inspections.[235] These seven commitments have been incorporated into the IPEC UFSAR

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233 Dec. 10, 2012 Tr. at 3329:8-22 (Holston).

234 Dec. 12, 2012 Tr. at 4063:12-4064:15 (Nguyen); *id.* at 4064:21-4065:3 (Doutt); *id.* at 4074:24-4075:16 (Cox).

235 *Id*. at 4063:12-4064:15 (Nguyen); *see also* Supplemental SER at 3-6 to 3-7 (NYS000160).

Supplement.[236] As confirmed by Mr. Doutt (and undisputed by New York), in the Staff's view, the commitments incorporated into the UFSAR Supplement are binding on Entergy and will become part of the IPEC licensing basis for the PEO.[237] Accordingly, the Board finds that the most critical aspects of EN-DC-346 have been incorporated into the IPEC licensing basis and are, therefore, binding and enforceable license renewal commitments.

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118. In sum, the Board concludes that the Inaccessible Cable Program described in LRA Section B.1.23 is consistent with the AMP described in GALL Report Section XI.E3; therefore, pursuant to the Commission's decision in *Oyster Creek*, we find that the Inaccessible Cable Program – by itself – provides reasonable assurance that Entergy will manage aging effects on all non-EQ inaccessible low- and medium-voltage cables during the PEO.

119. Although it is not necessary for us to reach beyond this finding in light of *Oyster Creek*, we further note that New York no longer challenges the technical adequacy of Entergy's Inaccessible Cable Program, as implemented by EN-DC-346, for purposes of managing the effects of aging caused by the exposure of cables to significant moisture.[238] In its Revised Position Statement, New York acknowledged:

> The Cable Reliability Program [(EN-DC-346)], and the information that it directs Entergy to gather at Indian Point includes all the essential details that are missing from the AMP with respect to the effects of aging caused by exposure of the cables to significant moisture – the age, length, insulation and shield type of the relevant cables, the specific cable condition monitoring tests, the trending of test

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236 Dec. 12, 2012 Tr. at 4064:21-4065:3 (Doutt); *see also* Supplemental SER at 3-8 to 3-9 (NYS000160).

237 Dec. 12, 2012 Tr. at 4067:2-15 (Doutt); *see also* Dec. 11, 2012 Tr. at 3966:12-16 (Green) (stating that when an applicant puts a commitment into its UFSAR, "[o]nce the license is renewed, our regulations require that [the applicant] submit an update to their UFSAR in accordance with 50.71(e). At that time [the commitment] would become part of their current licensing basis.").

238 New York Rebuttal Testimony at 2:11-13 (NYS000411).

results, the condition monitoring test acceptance criteria, and the required corrective actions.[239]

120. Considering the evidence presented and New York's acknowledgements, we find that the Inaccessible Cable Program described in the IPEC LRA is sufficiently linked with procedure EN-DC-346 and that the procedure provides a sufficient level of detail on how Entergy will implement the AMP in the PEO. The Board further finds that Entergy has committed to implement the essential elements of EN-DC-346, and that those commitments are binding and enforceable. Accordingly, we conclude that Entergy's AMP, together with implementing procedure EN-DC-346 and Entergy's license renewal commitments, provide sufficient specificity and reasonable assurance that Entergy will adequately manage aging effects on all non-EQ inaccessible low- and medium- voltage cables during the PEO.

D. IPEC's Inaccessible Cable Program Also Provides Reasonable Assurance that Entergy Will Adequately Manage the Aging Effects on Below-Ground Cables Within the Scope of the Program Caused by Thermal Stress

121. The second issue we must resolve is whether there is reasonable assurance that Entergy will adequately manage the aging effects on below-ground cables caused by thermal stress.[240]

122. New York asserts that Entergy lacks an AMP that adequately manages the aging effects on below-ground cables that are potentially exposed to thermal stress.[241] In particular, Mr. Bascom testified that, if a cable is exposed to elevated temperatures over an extended period of time, cable aging could be accelerated, and Entergy has not identified any processes to determine whether any cables at IPEC are exposed to elevated temperatures.[242] He further

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239 New York Revised Position Statement at 3 (NYS000410).

240 *See* list of issues to be resolved by the Board *supra* Section IV.B.

241 New York Revised Position Statement at 7 (NYS000410).

242 Dec. 12, 2012 Tr. at 4111:14-21 (Bascom).

asserted that Entergy should be required to monitor cable temperatures to identify "hot spots," or conditions that result in an elevated temperature along the cable, prior to any degradation occurring.[243] According to Mr. Bascom, hot spots can be caused not only by external heat sources but also by internal ohmic heating of the cables themselves.[244] Mr. Bascom identified the installation of thermocouples that measure temperature at particular points or fiber optic cables that measure temperatures along the length of the cable as methods to identify hot spots.[245]

123. Entergy and the Staff offered persuasive testimony and evidence to counter each of Mr. Bascom's assertions. As detailed below, Entergy witnesses Mr. Rucker and Dr. Sedding testified that, contrary to New York's assertion, below-grade cables that are potentially exposed to thermal stress are managed through the Inaccessible Cable Program, as implemented by EN-DC-346.[246] In addition, both Entergy and the Staff witnesses, including Dr. Sedding and Mr. Nguyen, offered testimony indicating that heat-related insulation degradation related to external heat sources or ohmic heating is not a cause for concern for the IPEC cables at issue in this contention.[247] Dr. Sedding and Mr. Nguyen further testified that any heat-related degradation, if it were to occur, would be detected by Entergy's cable testing program.[248] We address each of these issues further below.

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243 *Id*. at 4109:2-4, 4112:4-9 (Bascom).

244 *Id*. at 4109:9-19 (Bascom).

245 *Id*. at 4106:17-4107:2 (Bascom).

246 Entergy Testimony at 78 (A125) (ENTR00233).

247 Dec. 12, 2012 Tr. at 4116:12-16 (Sedding); *id.* at 4147:18-4152:5 (Nguyen).

248 *Id.* at 4127:11-4129:23 (Sedding); *id.* at 4151:12-16 (Nguyen).

1. Below Ground Cables Installed at IPEC Were Designed to Minimize the Potential for Hot Spots Caused By External Heat Sources and Ohmic Heating

124. Mr. McCaffrey testified that he reviewed numerous IPEC site drawings in response to New York's assertions regarding potential hot spots at the site.[249] His review determined that there are no external heat sources at IPEC that could create hot spots for the below-ground cables.[250] Mr. McCaffrey confirmed that the only potential source for hot spots at IPEC is ohmic heating from the cables themselves.[251] New York did not offer any testimony or evidence to the contrary.[252]

125. As Mr. McCaffrey testified, potential contributors to ohmic heating were addressed at IPEC's design stage to minimize the formation of hot spots.[253] Mr. McCaffrey reviewed a number of calculations related to cable design, selection, and installation prepared for IPEC's original plant design.[254] Through this review, Mr. McCaffrey confirmed that the plant's design accounted for ohmic heating by considering soil temperatures, the number of cables located in a conduit, "ampacity" (a cable's capacity to carry current), heat build-up associated with being buried and surrounded by other cables, and soil insulation effects.[255] New York presented no contrary testimony or evidence to suggest that IPEC's cables were improperly designed. In that regard, Mr. Bascom neither offered any critical views of Entergy's review of

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249 *Id.* at 4105:2-4, 4105:18-21 (McCaffrey).

250 *Id.*; *see also* Entergy Testimony at 78 (A125) (ENTR00233).

251 Dec. 12, 2012 Tr. at 4105:4-5 (McCaffrey).

252 *See id*. at 4109:10-16 (Bascom) ("I understand there is testimony that says that there are [no external heat sources] or none that have been identified.").

253 *Id.* at 4105:4-6 (McCaffrey) ("[T]he only potential source of heat would be the cables themselves. And again, that was designed for in the original design of the plant.").

254 *Id.* at 4108:10-20 (McCaffrey).

255 *Id*. at 4104:6-15, 4108:11-15 (McCaffrey); *see also id*. at 4147:23-24 (Nguyen) (defining ampacity as "the capacity of the cable to carry the current").

the plant design calculations nor challenged Entergy's assertion that IPEC's cables were properly designed.[256]

126. In addition, both Mr. McCaffrey and Mr. Nguyen testified that, if a cable is properly designed, the cable should not have any ohmic heating issues that will lead to heat-related degradation, because the cable ampacity will be calculated such that the cable will never exceed the rated temperature.[257] The Staff's witnesses testified that the extensive NRC industry research documented in the GALL Report and NUREG-1800 shows that localized hot spots related to either external heat sources or ohmic heating are not a concern for inaccessible cables of the type at issue in this contention.[258] This is because when designing, selecting, and installing a cable at a plant, a licensee would consider the ampacity limits (or capacity to carry current), conductor size and resistance, cable material, installation geometry, and ambient temperature in which the cable operates, thus precluding the formation of localized hot spots.[259] According to Mr. Doutt and Mr. Nguyen, the fact that the cables were originally designed for their installed environments explains why ohmic heating has not been shown to be a significant aging mechanism, both at IPEC specifically and within the nuclear industry generally.[260] Specifically, Mr. McCaffrey testified that there is no indication that IPEC cables have experienced any heat-related degradation due to ohmic heating.[261] In addition, the record

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256 *Id*. at 4161:14-23 (Bascom).

257 *Id*. at 4126:15-17 (McCaffrey); *id.* at 4148:15-17 (Nguyen).

258 NRC Staff Testimony at 26-27 (A29) (NRC000077).

259 *Id.* at 27 (A29).

260 *Id*.

261 Dec. 12, 2012 Tr. at 4104:16-19 (McCaffrey) ("Our operating experience from the site here is we have seen no degradation or failures on our medium voltage cables or our underground cables due to aging."); *id.* at 4115:25-4116:2 (McCaffrey) ("For Indian Point I know of no history of ohmic heating that has caused degradation of the cables.").

evidence reveals no evidence of any U.S. nuclear power plants that have reported any cable failures attributed to excessive ohmic heating.[262]

127. As noted previously, New York presented no testimony or evidence to suggest that IPEC's cables were improperly designed. Nor did it identify any examples of cable degradation caused by ohmic heating within the U.S. nuclear industry to counter Entergy's and the Staff's testimony.

128. Consequently, the Board finds the non-EQ inaccessible low- and medium-voltage cables installed at the site were appropriately designed to minimize the potential for hot spots caused by either external heat sources or ohmic heating.

2. Even if Hot Spots Caused by Ohmic Heating Were to Occur, There is Reasonable Assurance That Entergy's Cable Testing Program Would Detect Resulting Heat-Related Degradation

129. In any event, even if heat-related degradation occurred as a result of ohmic heating, Mr. McCaffrey, Mr. Rucker, and Dr. Sedding all testified that such degradation would be detectable using the same cable testing methods identified in EN-DC-346 that Entergy uses to test for moisture-related degradation.[263] Mr. Bascom acknowledged that the cable testing methods identified in EN-DC-346 would likely detect any insulation degradation caused by hotspots if it were to occur.[264]

130. At the hearing, the parties' witnesses testified at some length in response to Board questions regarding the adequacy of Entergy's cable inspection frequency (currently, at least once every six years) to detect heat-related degradation. Mr. Rucker testified that Entergy

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262 *Id*. at 4116:6-11 (Sedding) ("In the normal business of my company, we perform dissections and forensic analysis of cables typical of those installed at Indian Point. And basically over the dealings of my company, we are not aware at present date of any failures that we have observed due to excessive ohmic heating.").

263 *Id*. at 4104:22-4105:1, 4125:5-6, 4138:18-22 (McCaffrey); Entergy Testimony at 78 (A125) (ENTR00233).

264 Dec. 12, 2012 Tr. at 4112:4-6 (Bascom).

selected a six-year interval based on the NRC Staff's guidance in Section XI.E3 of the GALL Report, Rev. 2.[265] Mr. Doutt explained that the six-year testing interval is based on the Staff's review of industry operating experience and allows the collection of sufficient data points to observe any important adverse trends.[266] In the Staff's view, increasing the inspection frequency to once every three years, for example, was unnecessary, because industry data related to cable failures indicated that a six-year inspection interval was sufficient to monitor potential cable degradation.[267] Mr. Doutt also emphasized that the six-year interval was not a "fixed number," but rather a minimum testing interval, and the Staff would expect the testing frequency to increase if warranted by Entergy's inspection results.[268] Mr. Bascom acknowledged that testing cables more frequently than once every six years would not provide any additional useful information.[269] Moreover, Mr. McCaffrey and Dr. Sedding offered uncontroverted testimony that Entergy's cable testing program would detect thermal-related degradation caused by operating a cable at even very small temperatures increases over a cable's manufacturer rating, design rating, and operating temperature for an extended period of time.[270]

131. Based on the record, the Board concludes that, if hot spots caused by ohmic heating were to occur, there is reasonable assurance that the cable testing methods and the minimum testing frequency of once every six years identified in EN-DC-346 would detect any resulting thermal-related insulation degradation and allow for appropriate trending.

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265 *Id.* at 4087:14-20 (Rucker).

266 *Id*. at 4088:22-4089:2 (Doutt); *id.* at 4130:15-4131:10 (Sedding).

267 *Id.* at 4088:20-4089:2 (Doutt).

268 *Id.* at 4153:19-21 (Doutt).

269 *Id*. at 4089:8-10 (Bascom) ("I have no basis to suggest that a more frequent testing would provide any additional information.").

270 *Id*. at 4197:19-4198:18 (McCaffrey); *id.* at 4198:19-24 (Sedding).

3. There is No Evidence to Justify Retrofitting IPEC Cables with Temperature-Sensing Equipment to Detect Heat-Related Degradation Before It Occurs

132. Although Mr. Bascom acknowledged that the cable testing methods identified by Entergy would likely detect thermal-related degradation, he contended that Entergy should nevertheless take additional steps to monitor cable temperatures to identify possible hot spots prior to any degradation occurring.[271] In particular, Mr. Bascom identified the installation of thermocouples that measure buried cable temperature at particular points or fiber optic cables that measure temperatures along the length of buried cables as recommended methods to identify hot spots.[272]

133. At the hearing, however, Mr. Bascom acknowledged that he was not aware of any nuclear power plants that use temperature-sensing fiber optic cables and did not identify any nuclear power plants that employ thermocouples.[273] Nor did Mr. Bascom identify any nuclear power plants that had retrofitted its cables with such devices. Rather, he testified that he was familiar with examples outside of the nuclear industry and indicated that, in those examples, the fiber optic cables were installed where there was a "critical need" or perceived problem with elevated temperatures.[274]

134. Consistent with Mr. Bascom's testimony, Mr. Rucker, based on his involvement in industry license renewal working groups, testified that he was unaware of any nuclear plant undertaking such retrofitting actions.[275] Indeed, as Mr. McCaffrey and Dr. Sedding stated, such

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271 *Id*. at 4112:4-9 (Bascom).

272 *Id*. at 4106:17-4107:2 (Bascom).

273 *Id*. at 4107:4-10 (Bascom).

274 *Id*. at 4107:4-25 (Bascom).

275 *Id*. at 4192:10-23 (Rucker) ("I'm not aware of any nuclear plant doing a retrofit, to add a monitoring process like [fiber optic cables or thermocouples].").

a retrofit may not be feasible or practical at nuclear power plants, including IPEC.[276] Retrofitting IPEC's below-ground cables with such temperature monitoring devices would require Entergy to remove the currently-installed cables, due to the relative large size of the cables and the small size of the existing conduits.[277] The removal of the existing cable and installation of the temperature monitoring device presents the potential to cause mechanical damage to the cables.[278]

135. Based on the evidence presented, the Board finds there is no reasonable basis for retrofitting, and, in fact, that such retrofitting could cause cable damage.

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136. In sum, New York presented no evidence of the actual existence or occurrence of any hot spots or thermal-related degradation caused by ohmic heating at IPEC or at any other nuclear plant. To the contrary, the record indicates that ohmic heating has not caused any cable insulation degradation at IPEC. Based on the record evidence, we find that the non-EQ low- and medium-voltage cables installed below-ground at IPEC were properly designed to minimize the potential for insulation degradation caused by ohmic heating. In addition, the uncontroverted evidence shows, and the Board is satisfied, that Entergy's EN-DC-346 cable testing program would detect any thermal-related degradation caused by operating a cable at even very small temperatures increases over a cable's manufacturer rating, design rating, and operating temperature for an extended period of time. Consequently, the Board finds no support for the retrofit installation of temperature-sensing equipment at IPEC, as suggested by New York. For these reasons, we conclude that IPEC's Inaccessible Cable Program provides reasonable

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276 *Id*. at 4156:8-4157:7 (Sedding) (discussing logistical difficulties and potential for mechanical damage to cables in installing retrofit equipment); *id.* at 4193:6-25 (McCaffrey) (same) .

277 *Id*. at 4193:13-18 (McCaffrey).

278 *Id*. at 4193:19-25 (McCaffrey).

assurance that Entergy will adequately manage the effects of aging due to thermal stress on all below-ground cables within the scope of the program.

E. The NRC Staff and Entergy Have Appropriate Processes in Place to Ensure That Entergy Complies With Its Commitments and EN-DC-346

137. As we previously noted, the third issue the Board must address is whether there are appropriate processes in place to ensure that Entergy complies with its commitments related to the Inaccessible Cable Program and with EN-DC-346 during the PEO.[279]

138. Although New York acknowledges that EN-DC-346 includes the specific details that it had identified as missing from the Inaccessible Cable Program, it argues that EN-DC-346 is merely an internal corporate procedure that Entergy is not required to follow and able to "modify at will without any outside review."[280] New York further asserts that the Inaccessible Cable Program cannot provide the requisite reasonable assurance unless the EN-DC-346 procedure requirements are "elevated to a legally binding obligation imposed on Entergy as a condition in its renewal license" so that it cannot be changed without prior NRC approval."[281]

139. New York suggests that (1) any commitment short of a license condition is somehow not binding on Entergy or not enforceable by the NRC; and (2) Entergy is free to make changes to EN-DC-346 at will, without any NRC oversight.[282] New York is incorrect on both points. As explained below, Entergy cannot alter any license renewal commitments without following established processes, and failure to meet commitments can be the basis for NRC enforcement action. In addition, the NRC Staff will conduct audits and inspections before and

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279 *See* list of issues to be resolved by the Board *supra* Section IV.B.

280 Dec. 12, 2012 Tr. at 4072:19-24 (Bascom) ("[I]t appeared to me there is no requirement that they follow what's in that [EN-DC-346] reliability program. In other words, they have flexibility to modify at will without any outside review because it's an internal operating procedure."); *see also* New York Revised Position Statement at 5 (NYS000410).

281 New York Revised Position Statement at 5-6 (NYS000410).

282 *Id*. at 3-4.

during the PEO to ensure that Entergy is meeting its commitments.[283] Further, Entergy must follow its own procedures and cannot modify EN-DC-346 at will.[284] For any contemplated procedure changes, Entergy follows an established, rigorous process that complies with applicable regulations and requires several layers of independent technical review.[285] Such reviews are subject to NRC oversight and enforcement.[286]

1. The NRC Staff Has Processes to Ensure Entergy's Compliance with its Commitments and Internal Procedures

140. As discussed above, the essential elements of EN-DC-346 have been included in the IPEC UFSAR Supplement, and therefore, are binding and enforceable commitments.[287]

141. In addition, with respect to those elements of EN-DC-346 that are not specifically incorporated into the IPEC UFSAR Supplement, the record shows that the NRC Staff has processes in place to ensure that Entergy is adhering to its internal procedures.

142. Before the PEO begins, Mr. Doutt explained that the NRC Staff will perform an inspection in accordance with the guidance in NRC Inspection Procedure ("IP") 71003, "Post-Approval Site Inspection for License Renewal" (ENT000251).[288] As Staff witness Holston explained during the Contention NYS-5 hearing, the purpose of the IP 71003/Temporary

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283 Dec. 12, 2012 Tr. at 4079:2-21 (Doutt).

284 Dec. 10, 2012 Tr. at 3355:20-3356:9 (Cox).

285 Dec. 12, 2012 Tr. at 4082:21-4083:22 (McCaffrey).

286 *Id*. at 4190:20-22 (Cox).

287 *Id*. at 4063:12-4064:15 (Nguyen); *id.* at 4064:21-4065:3 (Doutt); *id.* at 4074:24-4075:16 (Cox); *see supra* Section IV.C.3.g.

288 Entergy Testimony at 59 (A97) (ENTR00233); *see also* Dec. 12, 2012 Tr. at 4079:2-9 (Doutt). As Mr. Doutt, Mr. Cox, and Mr. Rucker explained, given the end of the IP2 initial operating license term in 2013, the NRC Staff issued Temporary Instruction 2516/001 (ENT000252) to allow NRC inspectors to assess Entergy's progress in implementing its license renewal AMPs and commitments during the pendency of the license renewal approval process. NRC Region I inspectors completed an inspection at IP2 under Temporary Instruction 2516/001 during the week of March 5-9, 2012. *See* NRC Staff's Status Report in Response to the Atomic Safety and Licensing Board's Order of February 16, 2012 at 3-4 (Mar. 1, 2012), *available at* ADAMS Accession No. ML12061A455.

Instruction 2516/001 inspection is for the Staff to review Entergy's implementing procedures to ensure that each of the commitments made in the LRA have been incorporated in the procedures.[289] Mr. Holston further testified that, if the Staff found that Entergy had not incorporated its commitments into the procedures at the time of the inspection, Entergy would be subject to enforcement action.[290] Specifically, the Staff's inspection team would identify any "gap" in Entergy's implementation of its commitments and evaluate any deficiencies through the NRC's reactor oversight process to determine the severity of any finding or violation.[291]

143. During the PEO, Mr. Cox and Mr. Doutt testified that the NRC Staff will continue to conduct inspections and audits under the 10 C.F.R. Part 50, Appendix B inspection criteria as part of the NRC's general reactor oversight process.[292] Mr. Cox and Mr. Doutt further indicated that, as part of that oversight process, the NRC monitors Entergy's compliance with its internal procedures, including EN-DC-346.[293] As Mr. Cox testified, Entergy is required to follow its own procedures, and any failure to do so could result in a notice of violation under the NRC's Enforcement Policy.[294]

2. Any Procedure Modifications Made by Entergy are Subject to a Rigorous Internal Review Process and NRC Oversight

144. New York suggests that Entergy cannot rely on EN-DC-346 to demonstrate reasonable assurance because it can choose to modify the procedure "at will." We disagree. The

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289 Dec. 10, 2012 Tr. at 3356:14-3357:1 (Holston); *see also id.* at 3359:8-11 (Holston) ("And their job . . . specifically for that inspection is to verify that each of those commitments have been put into procedures."); *see also* Entergy Testimony at 59-60 (A97) (ENTR00233) (describing the Staff's IP 71003 inspection process).

290 Dec. 10, 2012 Tr. at 3357:2-4 (Holston) ("If a licensee has not . . . implemented those actions, they're subject to findings and violations.").

291 *Id*. at 3359:14-22 (Holston).

292 Dec. 12, 2012 Tr. at 4079:10-4080:9 (Doutt); *id.* at 4080:10-15 (Cox).

293 *Id.* at 4080:1-9 (Doutt); *id.* at 4080:10-15 (Cox).

294 *See* Dec. 10, 2012 Tr. at 3469:23-3470:25 (Cox) ("So to the extent that these are site procedures, they have to be followed by Entergy. They are enforceable in the sense that if we don't do what the procedure says, we are subject to a violation.").

record shows that prior to making any procedure modifications, Entergy would be required to conduct a rigorous internal review to determine whether the change would conflict with a commitment in the IPEC UFSAR Supplement or other licensing basis document, and actions taken as a result of that review will be subject to NRC oversight and possible enforcement action.[295]

145. As described by Mr. McCaffrey and in Entergy's corporate Process Applicability Determination ("PAD") procedure, when a procedure change is proposed, an engineer must complete a PAD Form to determine: (1) whether the proposed change will affect, or has the potential to affect, any licensing basis documents and processes; (2) the appropriate regulation to be used to review the proposed change; and (3) whether the proposed change requires a full 10 C.F.R. § 50.59 evaluation.[296] The PAD form itself is a seven-page document that requires the preparer to research and review applicable licensing basis documents; identify any regulations, licensing basis documents, and procedures that may be implicated or impacted by the proposed change; determine whether the proposed change requires review under 10 C.F.R. § 50.59 or other regulation; and, if a full Section 50.59 review is not required, to provide a narrative explanation of the basis for that conclusion.[297]

146. Mr. McCaffrey testified that, upon completion of the PAD Form, a second individual (who is also trained and qualified to perform PADs) performs a concurrence review

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295 Dec. 12, 2012 Tr. at 4082:21-4083:22 (McCaffrey).

296 *See* EN-LI-100, Rev. 12, Process Applicability Determination at 11 (Nov. 6, 2012) ("EN-LI-100") (ENT000602); *see also* Dec. 12, 2012 Tr. at 4085:12-25 (McCaffrey). At the hearing, the witnesses often referred to this procedure as the 10 C.F.R. § 50.59 "screening" procedure.

297 *See* EN-LI-100 at Attachment 9.1 (ENT000602).

for the proposed change.[298] If the reviewer concurs with the results, then the PAD Form is reviewed by a third individual, generally a department-level manager, for final approval.[299]

147. For those proposed procedure changes that do require a Section 50.59 evaluation, Entergy's "10 CFR 50.59 Evaluations" procedure establishes the methods for preparing, reviewing, approving, and documenting such evaluations.[300] Evaluations are documented on a 50.59 Evaluation Form.[301] Similar to the PAD process, upon completion of the 50.59 Evaluation Form, a second individual performs a concurrence review for the proposed change.[302] If the reviewer concurs with the results, then the evaluation form is reviewed by the IPEC Safety Review Committee ("OSRC") for final approval.[303]

148. The evidence shows that, contrary to New York's assertions, Entergy cannot simply "change procedures at will."[304] Rather, as Mr. Doutt, Mr. Rucker, and Mr. Cox indicated, Entergy would evaluate proposed modifications to EN-DC-346 (*e.g.*, changing the cable testing technique;[305] decreasing the cable testing frequency from once every six years to once every eight years;[306] or removing a requirement to replace unshielded cables exposed to long-term wetting[307]) pursuant to its PAD procedure, and if applicable, its 10 CFR 50.59 Evaluations

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298 *Id*. at 13; *see also* Dec. 12, 2012 Tr. at 4085:12-18 (McCaffrey).

299 Dec. 12, 2012 Tr. at 4086:1-5 (McCaffrey).

300 EN-LI-101, Rev. 9, 10 CFR 50.59 Evaluations (Feb. 16, 2012) ("EN-LI-101") (ENT000603).

301 *Id*. at Attach. 9.1.

302 *Id*. at 9.

303 *Id*. at 8. The OSRC is a committee that independently reviews operational activities in order to provide additional assurance that the plant is operated and maintained to ensure nuclear safety. *Id*.

304 Dec. 12, 2012 Tr. at 4189:13-20 (Cox).

305 *See id*. at 4176:22-4177:11 (Rucker).

306 *Id*. at 4077:4-7 (Cox).

307 *Id*. at 4180:14-19 (Doutt).

procedure to determine whether the procedure change would conflict with a commitment in the IPEC UFSAR Supplement or other licensing basis document.[308]

149. Further, as Mr. Cox explained, Entergy is required to maintain completed PAD Forms and 50.59 Evaluation Forms as plant records.[309] The PAD records are available to the NRC for inspection at any time, and if upon review, the NRC concluded that those evaluations were improperly performed, Mr. Cox confirmed that Entergy could be subject to potential enforcement action.[310] With respect to the Section 50.59 evaluations, Entergy is required by regulation to submit a report summarizing its evaluations to the NRC for its review at least once every two years.[311]

150. For its part, the NRC Staff also conducts periodic inspections of Entergy's Section 50.59 evaluation program.[312] In late 2011, for example, a team of six NRC inspectors conducted an on-site inspection of IPEC's Section 50.59 evaluation program.[313] The Staff's inspection included a review of Section 50.59 screenings and evaluations, interviews with plant personnel, and a review of supporting calculations and other documents.[314] For the samples

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308 *See id*. at 4082:21-4083:22 (McCaffrey); *id.* at 4189:13-20 (Cox); *see also* Dec. 10, 2012 Tr. at 3403:1-6 (Cox) ("[P]rocedures are, again, under the control of [the] 50.59 process. So there has to be an evaluation done of those procedures to make sure we don't make unacceptable changes that would reduce the level of safety or effectiveness of that program.").

309 Dec. 12, 2012 Tr. at 4190:13-14 (Cox).

310 *Id*. at 4190:20-22 (Cox).

311 10 C.F.R. § 50.59(d)(2); *see also* EN-LI-101 at 12 (ENT000603).

312 Dec. 10, 2012 Tr. at 3404:12-19 (Holston) (The NRC "inspectors look at a wide range of 50.59 screens that have been conducted to ensure that the process is being followed properly.").

313 *See* Letter from Lawrence T. Doerflein, Division of Reactor Safety Engineering Branch 2 Chief, NRC, to John Ventosa, Site Vice President, IPEC, enclosing NRC Inspection Report 05000247/2011007 and 05000286/2011007 (Jan. 13, 2012) (ENT000604).

314 *Id*. at Enclosure 1, 1.

reviewed, the inspection team concluded that Entergy had appropriately conducted its Section 50.59 screenings and evaluations.[315]

151. Although New York appears to assume that any modifications to EN-DC-346 would result in less conservative measures,[316] this is mere speculation. To the contrary, more effective cable testing methods may emerge as the state-of-the-art evolves during IPEC's renewal period.[317] Entergy's technical evaluation processes allow Entergy the flexibility to adopt measures that enhance—not diminish—the effectiveness of the Inaccessible Cable Program and plant safety.[318] We agree that such flexibility, in conjunction with established regulatory processes, including the 10 C.F.R. § 50.59 process, is appropriate and reasonable.

152. The record evidence demonstrates that Entergy has implemented rigorous processes to evaluate proposed procedure changes that include multiple levels of technical review, even for those procedure changes that do not require a full Section 50.59 evaluation. Both the screening and the full Section 50.59 evaluations are subject to NRC review, inspection, and enforcement authority through its Part 50 reactor oversight process. Accordingly, the Board is satisfied that Entergy's PAD and Section 50.59 processes, as reviewed and overseen by the Staff, provide reasonable assurance that Entergy will continue to implement EN-DC-346 in accordance with its commitments during the renewal period.

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153. For the reasons above, we find that IPEC's Inaccessible Cable Program provides reasonable assurance that Entergy will adequately manage the aging effects on all below-ground

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315 *Id*.

316 *See* New York Revised Position Statement at 5-6 (NYS000410) (asserting that reasonable assurance is incompatible with Entergy's ability to modify EN-DC-346).

317 Dec. 12, 2012 Tr. at 4004:2-11 (Nguyen).

318 *Id.*

low- and medium-voltage cables within the scope of the program. We further find that Entergy and the Staff have sufficient existing procedural and regulatory processes in place to ensure that Entergy will comply with its Inaccessible Cable Program commitments and with EN-DC-346 requirements during the PEO.

F. IPEC's Cables and Connections Program Provides Reasonable Assurance That Entergy Will Adequately Manage Aging Effects on All Above-Ground Medium- and Low-Voltage Cables Within the Scope of the Program

154. As noted above, and as Mr. Cox and Mr. Rucker testified, IPEC's Cables and Connections Program applies to above-ground non-EQ insulated medium-voltage and low-voltage cables and connections that may be exposed to a potential adverse local equipment environment ("ALEE"), regardless of whether they are accessible (*i.e.*, readily accessible and easily approached and viewed[319]), or inaccessible. The implementing procedure for the Cables and Connections Program is Entergy fleet procedure EN-DC-348, Non-EQ Insulated Cables and Connections Inspection.[320]

155. New York does not challenge the technical adequacy of the Cables and Connections Program or its implementing procedure insofar as they pertain to aging management of above-ground cables. At the evidentiary hearing, Mr. Bascom acknowledged that he had "no basis to evaluate or assume that there would be an issue with the above-ground cables that were inaccessible" and within the scope of the Cables and Connections Program.[321] Although the adequacy of this AMP is not being challenged by New York, we nonetheless discuss it here briefly for completeness of the record.

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319 Entergy Testimony at 47 (A75) (ENTR00233).

320 EN-DC-348 (ENT000241).

321 Dec. 12, 2012 Tr. at 4103:18-21 (Bascom).

156. Mr. Cox and Mr. Rucker stated that Entergy relied on the guidance in the GALL Report, Rev. 1 in preparing its description of the Cables and Connection Program in the IPEC LRA, which is described in LRA Section B.1.25.[322] They further testified that IPEC's Cables and Connections Program is the same as the program described in GALL Report, Rev. 1, Section XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."[323]

157. As more fully described by Mr. Rucker in Entergy's prefiled testimony, under the implementing procedure, EN-DC-348, Entergy completed all of the necessary inspections of above-ground non-EQ low- and medium-voltage cables at IPEC by March 2012.[324] In addition, Mr. Rucker and Mr. Cox explained that Entergy relies on the IPEC corrective action process to evaluate inaccessible cables located in an ALEE and to determine if further actions are needed.[325]

158. For these reasons, the Board concludes that Entergy will adequately manage the aging effects on cables within the scope of the Cables and Connections Program during the PEO.

V. SUMMARY FINDINGS OF FACT AND CONCLUSIONS OF LAW

159. Based upon a review of the entire record of this proceeding and the proposed findings of fact and conclusions of law submitted by the parties, and based upon the findings set forth above, which are supported by reliable, probative, and substantive evidence in the record, the Board has decided all matters in controversy on NYS-6/7 and reaches the following conclusions.

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322 Entergy Testimony at 46 (A74) (ENTR00233); *see also* LRA at B-85 to B-86 (ENT00015B).

323 Entergy Testimony at 46 (A74) (ENTR00233). There were no changes to this program in the GALL Report, Rev. 2.

324 *Id*. at 79 (A127).

325 *Id*. at 48 (A79); EN-LI-102, Rev. 17, Corrective Action Process (Dec. 8, 2011) (ENT000249).

160. The Board finds that IPEC's Inaccessible Cable Program described in LRA Section B.1.23 is consistent with the AMP described in GALL Report, Rev. 1, Section XI.E3 and that Entergy's expanded Inaccessible Cable Program meets the intent of Section XI.E3 of the GALL Report, Rev. 2. Based on its consistency with the GALL Report AMP, we conclude as a matter of law pursuant to the Commission's decision in *Oyster Creek* that the Inaccessible Cable Program provides the requisite reasonable assurance.

161. The Board further finds that there is a clear link between the Inaccessible Cable Program and procedure EN-DC-346. We find that EN-DC-346 provides a sufficient level of detail on how Entergy will implement its Inaccessible Cable Program in the PEO. Specifically, EN-DC-346 includes sufficient details regarding the cables within the scope of the program, corrective actions Entergy will take in the event inspections reveal anomalous conditions, cable testing methods, test acceptance criteria, and the schedule for testing completion.

162. In addition, we find that the essential elements of EN-DC-346 have been included as commitments in the IPEC UFSAR Supplement. Specifically, Entergy has committed to: (1) include low-voltage cables within the scope of the Inaccessible Cable Program; (2) remove the "significant voltage exposure" criterion for medium-voltage cables; (3) perform manhole inspections at least annually; (4) test for insulation degradation at least once every six years; (5) perform event-driven manhole inspections following events such as heavy rain or flooding; (6) review cable test results to determine the need for more frequent testing; and (7) review manhole inspection results to determine the need for more frequent inspections. These seven commitments have been incorporated into the IPEC UFSAR Supplement, which is part of the IPEC licensing basis, and therefore, are binding on Entergy. Consequently, Entergy may not alter or deviate from these license renewal commitments without following appropriate change

processes. Any failure to meet license renewal commitments can be the basis for NRC enforcement action. Consequently, the Board finds that Entergy's AMP, together with implementing procedure EN-DC-346 and Entergy's license renewal commitments, provide sufficient specificity and reasonable assurance that Entergy will adequately manage aging effects on all non-EQ inaccessible low- and medium- voltage cables during the PEO.

163. With respect to potential cable degradation caused by thermal stress, the record indicates that there are no external heat sources at IPEC that could create potential hot spots for the below-ground cables, and that the only potential source for hot spots at IPEC is ohmic heating of the cables themselves. The Board also finds that the non-EQ low- and medium-voltage cables installed below-ground at IPEC were properly designed to minimize the potential for insulation degradation caused by ohmic heating. Further, the record does not indicate that ohmic heating has caused cable insulation degradation at IPEC or within the U.S nuclear industry generally. Even if ohmic heating were to occur, however, we are satisfied that Entergy's EN-DC-346 cable testing program (both the testing methods and frequency) would detect thermal-related degradation. Retrofitting IPEC's cables with temperature-sensing devices to detect heat-related degradation before it occurs would neither be feasible nor practical, and the Board found no evidence supporting the need to retrofit such equipment at IPEC. For these reasons, the Board concludes that IPEC's Inaccessible Cable Program provides reasonable assurance that Entergy will adequately manage the aging effects on all below-ground non-EQ inaccessible low- and medium-voltage cables caused by thermal stress during the PEO.

164. We further find that the essential elements of EN-DC-346 have been included in the IPEC UFSAR Supplement, and therefore, are binding and enforceable commitments. With regard to those elements of EN-DC-346 that are not specifically incorporated into the IPEC

UFSAR Supplement, the record shows that the NRC Staff has processes in place to ensure that Entergy is adhering to its own procedures. Moreover, Entergy has implemented rigorous internal processes to evaluate proposed procedure changes that include multiple levels of technical review, even for those procedure changes that do not require a full 10 C.F.R. § 50.59 evaluation. Accordingly, the Board finds that Entergy and the Staff have sufficient existing processes in place to ensure that Entergy will comply with its Inaccessible Cable Program commitments and with EN-DC-346 during the PEO.

165. Finally, although Entergy's Cables and Connections Program was not challenged by New York on either a technical or implementation basis, for completeness, the Board finds that Entergy's AMP is consistent with the relevant AMP in the GALL Report. Accordingly, pursuant to Commission precedent, the Board concludes that the Cables and Connections Program provides reasonable assurance that Entergy will adequately manage the aging effects on all above-ground medium- and low-voltage cables within the scope of the program.

166. In summary, the Board has considered all of the issues, motions, and arguments presented for this contention. We conclude that the preponderance of the evidence shows that Entergy has taken, or will take, actions necessary to provide reasonable assurance that the effects of aging will be managed during the PEO for non-EQ inaccessible low- and medium-voltage cables within the scope of IPEC's Inaccessible Cable Program and Cables and Connections Program. The Board thus finds that Entergy has carried its burden of proof and satisfied its obligations under 10 C.F.R. §§ 54.21 and 54.29. Accordingly, we resolve Contention NYS-6/7 in Entergy's favor.

VI. ORDER

WHEREFORE, IT IS ORDERED, pursuant to 10 C.F.R. §§ 2.1210 and 51.104(a)(3), that New York's Contentions NYS-6 and NYS-7 are resolved on the merits in favor of Entergy.

IT IS FURTHER ORDERED, this Partial Initial Decision will constitute a final decision of the Commission forty (40) days from the date of issuance (or the first agency business day following that date if it is a Saturday, Sunday, or federal holiday, *see* 10 C.F.R. § 2.306(a)), unless a petition for review is filed in accordance with 10 C.F.R. § 2.1212, or the Commission directs otherwise.

IT IS FURTHER ORDERED that any party wishing to file a petition for review on the grounds specified in 10 C.F.R. § 2.341(b)(1) must do so within twenty-five (25) days after service of this Partial Initial Decision. The filing of a petition for review is mandatory for a party to have exhausted its administrative remedies before seeking judicial review. Within twenty-five (25) days after service of a petition for review, parties to the proceeding may file an answer supporting or opposing Commission review. Any petition for review and any answer shall conform to the requirements of 10 C.F.R. § 2.341(b)(2)-(3).

Although this ruling resolves all matters before the Board in connection with Contentions NYS-6 and NYS-7, NRC Staff issuance of the renewed operating licenses under 10 C.F.R. Part 54 must abide, among other things, the resolution of the remaining admitted contentions, including those contentions designated for future hearings.

Respectfully submitted,

Executed in Accord with 10 C.F.R. § 2.304(d)

William B. Glew, Jr., Esq.
William C. Dennis, Esq.
ENTERGY SERVICES, INC.
440 Hamilton Avenue
White Plains, NY 10601
Phone: (914) 272-3202
Fax: (914) 272-3205
E-mail: wglew@entergy.com
E-mail: wdennis@entergy.com

Kathryn M. Sutton, Esq.
Paul M. Bessette, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004
Phone: (202) 739-3000
Fax: (202) 739-3001
E-mail: ksutton@morganlewis.com
E-mail: pbessette@morganlewis.com

Martin J. O'Neill, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1000 Louisiana Street
Suite 4000
Houston, TX 77002
Phone: (713) 890-5710
Fax: (713) 890-5001
E-mail: martin.oneill@morganlewis.com

COUNSEL FOR ENTERGY NUCLEAR OPERATIONS, INC.

Dated in Washington, D.C.
this 22nd day of March 2013

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	March 22, 2013

CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305 (as revised), I certify that, on this date, copies of "Entergy's Proposed Findings of Fact and Conclusions of Law For Contentions NYS-6 and NYS-7 (Non-Environmentally Qualified Inaccessible Medium- And Low-Voltage Cables)" were served upon the Electronic Information Exchange (the NRC's E-Filing System), in the above-captioned proceeding.

Signed (electronically) by Lance A. Escher

Lance A. Escher, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Ave. NW
Washington, DC 20004
Phone: (202) 739-5080
Fax: (202) 739-3001
E-mail: lescher@morganlewis.com

COUNSEL FOR ENTERGY NUCLEAR OPERATIONS, INC.

DB1/ 72977034