


United States Nuclear Regulatory Commission Official Hearing Exhibit

	In the Matter of: Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3)	
	ASLBP #: 07-858-03-LR-BD01	Identified: 10/15/2012
	Docket #: 05000247   05000286	Withdrawn:
	Exhibit #: ENT000232-00-BD01	Stricken:
	Admitted: 10/15/2012	Other:

ENT000232  
Submitted: March 29, 2012

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

**BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

In the Matter of	)	Docket Nos. 50-247-LR and
ENTERGY NUCLEAR OPERATIONS, INC.	)	50-286-LR
(Indian Point Nuclear Generating Units 2 and 3)	)	March 29, 2012

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**ENTERGY'S STATEMENT OF POSITION REGARDING  
CONTENTIONS NYS-6/NYS-7  
(NON-EQ INACCESSIBLE MEDIUM- AND LOW-VOLTAGE CABLES)**

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Pursuant to 10 C.F.R. § 2.1207(a)(1) and the Atomic Safety and Licensing Board’s (“Board”) Order Granting NRC Staff’s Unopposed Time Extension Motion and Directing Filing of Status Updates,<sup>1</sup> Entergy Nuclear Operations, Inc. (“Entergy”) submits this Statement of Position (“Statement”) on New York State (“NYS”) contentions NYS-6 and NYS-7 (collectively, “NYS-6/7”) concerning non-environmentally qualified (“EQ”) inaccessible medium- and low-voltage cables. This Statement is supported by the Testimony of Applicant Witnesses Alan B. Cox, Roger B. Rucker, Thomas S. McCaffrey, and Howard G. Sedding Concerning Contentions NYS-6/7 (Non-EQ Inaccessible Medium- and Low-Voltage Cables) (“Entergy Test.”) (ENT000233), and the exhibits thereto (ENT000012, ENT000015, ENT000031, ENT000041, ENT000092, ENT000095, and ENT000234 through ENT000256). As discussed below, NYS-6/7 lacks merit and should be resolved in Entergy’s favor.

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<sup>1</sup> Licensing Board Order Granting NRC Staff’s Unopposed Time Extension Motion and Directing Filing of Status Updates at 1 (Feb. 16, 2012) (unpublished).

## I. PRELIMINARY STATEMENT

In Contentions NYS-6 and NYS-7, NYS asserts that Entergy failed “to provide an adequate and specific program to manage the effects of aging on non-environmentally qualified (‘non-EQ’) inaccessible low- and medium-voltage power cables that are exposed to adverse localized environmental conditions.”<sup>2</sup>

In NYS-6, NYS asserts that Entergy has not demonstrated that it will manage aging effects on non-EQ inaccessible low- and medium-voltage cables exposed to significant moisture, because the license renewal application (“LRA”) for Indian Point Units 2 and 3 (“IP2” and “IP3,” referred to jointly as Indian Point Energy Center, or “IPEC”) purportedly “lacks any substantive detail.”<sup>3</sup> As shown in Entergy’s expert testimony, however, LRA Section B.1.23, as amended, sufficiently describes Entergy’s Non-EQ Inaccessible Medium-Voltage Cable Program (“Inaccessible Cable Program”). LRA Section B.1.23 references and is consistent with the aging management program (“AMP”) for such cables recommended in the relevant Nuclear Regulatory Commission (“NRC” or “Commission”) guidance – NUREG-1801, Generic Aging Lessons Learned (GALL) Report, Rev. 1, Section XI.E3 (Sept. 2005) (“NUREG-1801” or “GALL Report”) (NYS00146A-C). Further, LRA Section B.1.23 meets the intent of NUREG-1801, Revision 2, which the NRC issued in December 2010 (several years after Entergy submitted the

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<sup>2</sup> State of New York’s Initial Statement of Position, Contentions NYS-6 and 7, at 1 (Dec. 15, 2011) (“NYS Statement of Position”) (NYS000135) (footnote omitted).

<sup>3</sup> Prefiled Written Testimony of Earle C. Bascom III Regarding Contentions NYS-6 and 7 at 5 (“Bascom Test.”) (NYS000136). In this context, a “non-EQ” cable is one that is not required to be environmentally qualified in accordance with 10 C.F.R. § 50.49, because it is used in “mild” plant environment or, by design, is 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. Entergy Test. at A31 (ENT000233). An “inaccessible” cable in the context of Entergy’s LRA Section B.1.23 AMP is one that is installed underground or below grade. *Id.* at A32.

IPEC LRA).<sup>4</sup> Both revisions of NUREG-1801 contain the NRC Staff’s generic evaluation of existing plant programs, and an applicant’s LRA may reference NUREG-1801 to demonstrate that its programs “correspond to those reviewed and approved in the GALL Report.”<sup>5</sup> As the testimony further shows, 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. Furthermore, the NRC Staff approved Entergy’s Inaccessible Cable Program and found that the program: (1) is consistent with NUREG-1801; (2) appropriately incorporates operating experience; and (3) meets the requirements of 10 C.F.R. § 54.21(a)(3).<sup>6</sup>

Contrary to NYS’s claim that Entergy “simply rely[ies] on its commitment to incorporate the [NUREG-1801] attributes in a plan yet to be created,”<sup>7</sup> Entergy has developed a fleet-wide “Cable Reliability Program” procedure (EN-DC-346) that is consistent with NRC and industry guidance and contains specific instructions for implementing the NRC-approved Inaccessible Cable Program at IPEC.<sup>8</sup> In particular, Entergy has developed lists of all medium- and low-voltage cables that are within the scope of the IPEC Inaccessible Cable Program, along with relevant identifying information and cable characteristics. In addition, as the procedure requires, Entergy takes periodic actions to prevent cables from being exposed to significant moisture, such as inspecting cable manhole to identify water accumulation and removing water if needed.

Consistent with industry guidance, the Inaccessible Cable Program also uses proven, state-of-the-

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<sup>4</sup> NUREG-1801, Generic Aging Lessons Learned (GALL) Report, Rev. 2, (“GALL Report, Rev. 2”) (Dec. 2010) (NYS00147A-D).

<sup>5</sup> See, e.g., GALL Report, Rev. 2, at iii (NYS00147A).

<sup>6</sup> See 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 (Aug. 2011) (“Supplemental SER”) (NYS000160).

<sup>7</sup> NYS Statement of Position at 17 (NYS000135).

<sup>8</sup> See Entergy, Procedure EN-DC-346, Cable Reliability Program, Rev. 2 (Jun. 14, 2011) (ENT000237).

art methods for establishing and testing the insulation condition of medium- and low-voltage power cables. Entergy has begun testing cables covered by the Inaccessible Cable Program and is scheduled to complete the necessary tests before the IP2 and IP3 extended periods of operation begin. Finally, IPEC's corrective action program requires that necessary and appropriate corrective actions be taken when inspection or test results do not meet the applicable acceptance criteria.

In NYS-7, NYS alleges that Entergy has not provided "any plan to manage the effects of aging on non-EQ inaccessible low- and medium- voltage power cables that are exposed to other localized adverse environmental conditions, such as excessive heat."<sup>9</sup> This claim is unfounded and does not take into account the relevant program described in detail in Section B.1.25 of Entergy's LRA – *i.e.*, the Non-EQ Insulated Cables and Connections Program ("Cables and Connections Program").<sup>10</sup> Entergy's Cables and Connections Program applies to aboveground low-voltage and medium-voltage electrical cables and connections (*i.e.*, accessible and inaccessible cable systems) that are subject to aging management review and installed in adverse localized equipment environments ("ALEEs") caused by temperature, radiation, or moisture.<sup>11</sup> Entergy procedure EN-DC-348, "Non-EQ Insulated Cables and Connections Inspection," implements the Cables and Connections Program in a manner consistent with industry standards.<sup>12</sup>

NYS has failed to meet its burden of providing sufficient evidence to support its claims.

In contrast, Entergy's testimony demonstrates that IPEC's Inaccessible Cables Program and

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<sup>9</sup> Pre-Filed Written Testimony of Earle C. Bascom III Regarding Contentions NYS-6 and 7, at 6 ("Bascom Test.") (Dec. 14, 2011) (NYS000136).

<sup>10</sup> See LRA at B-85 (ENT00015A).

<sup>11</sup> *Id.*

<sup>12</sup> See EN-DC-348, "Non-EQ Insulated Cables and Connections Inspection," Rev. 2 (July 5, 2011) (ENT000241).

Cables and Connections Program meet all applicable regulatory requirements and provide reasonable assurance that aging effects on non-EQ low- and medium-voltage cables that are exposed to significant moisture or other ALEEs can be adequately managed during the extended operation period.

## II. PROCEDURAL HISTORY OF CONTENTION NYS-6/7

On April 23, 2007, Entergy filed its application to renew the operating licenses for IP2 and IP3 for 20 years beyond their current expiration dates of September 28, 2013, and December 12, 2015, respectively. After a notice of opportunity for hearing was published in the *Federal Register* on August 1, 2007,<sup>13</sup> NYS filed a petition to intervene, proposing a number of contentions, including NYS-6 and NYS-7.<sup>14</sup>

As proffered, NYS-6 alleged that the IPEC LRA failed to comply with 10 C.F.R. §§ 54.21(a) and 54.29 because it purportedly lacked an adequate plan for managing aging of non-EQ inaccessible medium-voltage cables.<sup>15</sup> In particular, NYS 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 Electric Power Research Institute (“EPRI”) guidance documents referenced therein; (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;

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<sup>13</sup> 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).

<sup>14</sup> See New York State Notice of Intention to Participate and Petition to Intervene (Nov. 30, 2007) (“NYS Petition”), available at ADAMS Accession No. ML073400187.

<sup>15</sup> NYS Petition at 92.



and (4) justified differences between programs for aging management of accessible cables and inaccessible cables.<sup>16</sup>

NYS-7 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 located in or near ALEEs. Specifically, NYS 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.<sup>17</sup>

The Board consolidated NYS-6 and NYS-7 and admitted them as contention NYS-6/7 for further proceedings on whether Entergy has 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 extended operation periods.<sup>18</sup>

On December 15, 2011, pursuant to the Board's Order Granting Unopposed Motion to Amend the Scheduling Order,<sup>19</sup> NYS 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.<sup>20</sup> Mr. Bascom is President and Principal Engineer of Electrical Consulting Engineers. His professional experience includes design and review of underground transmission circuits, cost studies and evaluations of underground cable alternatives, analyses for pipe-type

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<sup>16</sup> *See id.* at 93-100.

<sup>17</sup> *Id.* at 101.

<sup>18</sup> *Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 86, 218 (2008).

<sup>19</sup> Licensing Board Order Granting Unopposed Motion to Amend the Scheduling Order at 1 (Nov. 17, 2011) (unpublished) ("Amended Scheduling Order").

<sup>20</sup> *See* NYS Statement of Position (NYS000135); Bascom Test. (NYS000136); Report of Earle C. Bascom III, P.E. in Support of Contentions NYS-6 and 7 (Dec. 13, 2011) ("Bascom Report") (NYS000138); *see also* NYS000135 through NYS000162.

cables, and research involving underground cables. However, Mr. Bascom's *curriculum vitae* reflects no experience specific to the nuclear power industry or nuclear regulation, including the NRC's regulations in 10 C.F.R. Parts 50 and 54.<sup>21</sup>

NYS's and Mr. Bascom's principal claims in support of NYS-6/7 are that Entergy's Non-EQ Inaccessible Medium-Voltage Cable Program 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.*, the age of the in-scope cable circuits, the number of cable circuits, the lengths of cable circuits, the voltage class of the cables, and the types of cables, including insulation types); (4) explain what corrective actions it will 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 passes or fails a condition monitoring test; and (7) identify what corrective actions Entergy will take if a defective cable is found.<sup>22</sup> Further, Mr. Bascom alleges that Entergy has provided no plan to manage the effects of aging on non-EQ inaccessible low- and medium- voltage power cables that are exposed to ALEEs, such as excessive heat.<sup>23</sup>

As demonstrated in Entergy's testimony on NYS-6/7 and summarized below, Mr. Bascom's opinion lacks a sound technical and factual foundation.

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<sup>21</sup> See *Curriculum Vitae* of Earle C. (Rusty) Bascom, III (Dec. 15, 2011) (NYS000137).

<sup>22</sup> Bascom Test. at 5 (NYS000136); see also *id.* at 34-35.

<sup>23</sup> *Id.* at 6.

### III. APPLICABLE LEGAL AND REGULATORY STANDARDS

#### A. 10 C.F.R. Part 54 Requirements

##### 1. Regulatory Requirements

Under the governing regulations in Part 54, the review of license renewal applications is confined to matters relevant to the period of extended operation. In this regard, the Commission has stated that “[a]djudicatory 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.”<sup>24</sup> The Commission has specifically limited its license renewal safety review to the matters specified in 10 C.F.R. §§ 54.21 and 54.29(a)(2), which focus on the aging management of certain systems, structures, and components (“SSCs”), and the review of time-limited aging analyses.<sup>25</sup>

10 C.F.R. § 54.4(a)(1) to (3) outline the three general categories of SSCs that fall within a license renewal’s scope. The first category consists of “safety-related” SSCs, which are SSCs relied upon to remain functional during and following design-basis events to ensure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to those referred to in §§ 50.34(a)(1), 50.67(b)(2), or 100.11.<sup>26</sup> The second category consists of all non-safety-related SSCs whose failure could prevent satisfactory accomplishment of any of the safety functions

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<sup>24</sup> *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), CLI-01-17, 54 NRC 3, 10 (2001); *see also* Nuclear Power Plant License Renewal; Revisions, 60 Fed. Reg. 22,461, 22,482 n.2 (May 8, 1995) (“1995 License Renewal SOC”)(NYS000016).

<sup>25</sup> *See Turkey Point*, CLI-01-17, 54 NRC at 7-8; *Duke Energy Corp.* (McGuire Nuclear Station, Units I and 2), CLI-02-26, 56 NRC 358, 363 (2002).

<sup>26</sup> 10 C.F.R. § 54.4(a)(1); *see id.* § 50.2 (defining “safety-related SSCs”).

discussed in connection with the first category.<sup>27</sup> The third category consists of all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the NRC's regulations for fire protection (10 C.F.R. § 50.48), environmental qualification (10 C.F.R. § 50.49), pressurized thermal shock (10 C.F.R. § 50.61), anticipated transients without scram (10 C.F.R. § 50.62), and station blackout (10 C.F.R. § 50.63).<sup>28</sup>

If a structure or component performs no intended function as defined in 10 C.F.R. § 54.4(a)(1)-(3), then it is not subject to AMR. 10 C.F.R. § 54.4(b). Moreover, even as to those SSCs that “perform an intended function [as defined in § 54.4(a)(1) to (3)],” Section 54.21(a)(1)(i) further limits those structures and components subject to AMR to those structures and components that “perform an intended function [as defined in § 54.4(a)(1)-(3)] . . . without moving parts or without a change in configuration or properties” and that are not subject to replacement based on a qualified life or specified time period.<sup>29</sup>

Section 54.21(a)(1)(i) lists examples of structures and components that require aging management review, including electrical cables.

## 2. NRC Staff Guidance

The NRC Staff reviews license renewal applications in accordance with the requirements in 10 C.F.R. Part 54, as well as Staff guidance contained in NUREG-1800.<sup>30</sup> NUREG-1801 provides the technical basis for NUREG-1800 and identifies AMPs that the Staff has accepted as

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<sup>27</sup> *Id.* § 54.4(a)(2).

<sup>28</sup> *Id.* § 54.4(a)(3).

<sup>29</sup> *Id.* § 54.21(a)(i)-(ii).

<sup>30</sup> NUREG-1800, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, Rev. 1 (Sept. 2005) (“NUREG-1800” or “SRP-LR”) (NYS000195).

meeting the requirements of Part 54. The NRC issued Revision 2 of NUREG-1800 and Revision 2 of NUREG-1801 in December 2010.<sup>31</sup>

NUREG-1801 is treated in the same manner as an NRC-approved topical report that is generically applicable.<sup>32</sup> Therefore, an applicant may reference NUREG-1801 in an LRA to demonstrate that its aging management programs correspond to those that the NRC staff reviewed and approved in NUREG-1801.<sup>33</sup> Adherence to NUREG-1801 guidance thus constitutes one acceptable way to manage aging effects for license renewal.<sup>34</sup>

A license renewal applicant's use of the guidance in NUREG-1801, Revision 1 satisfies regulatory requirements under 10 C.F.R. Part 54.<sup>35</sup> As the Commission very recently reiterated, "Where the NRC develops a guidance document to assist in compliance with applicable regulations, it is entitled to special weight."<sup>36</sup> In particular, for license renewal safety issues, 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."<sup>37</sup> The Commission has further stated that "a commitment to implement an AMP that the NRC finds is consistent with the GALL Report constitutes one acceptable method

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<sup>31</sup> See NYS000161, NYS00147A-D.

<sup>32</sup> GALL Report, Rev. 2 at 8 (NYS00147A).

<sup>33</sup> *Id.*

<sup>34</sup> *Id.*

<sup>35</sup> See, e.g., *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC 461,468 (2008).

<sup>36</sup> *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)); see also *id.* ("We recognize, of course, that guidance documents do not have the force and effect of law. Nonetheless, guidance is at least implicitly endorsed by the Commission and therefore is entitled to correspondingly special weight.") (*quoting Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), CLI-05-15, 61 NRC 365, 375 n.26 (2005).

<sup>37</sup> See *Oyster Creek*, CLI-08-23, 68 NRC at 468 (emphasis added).

for compliance with 10 C.F.R. § 54.21(c)(1)(iii).”<sup>38</sup> To question the sufficiency of a guidance document that the applicant seeks to rely on, an intervenor must provide specificity and substantial support in order to overcome the “special weight” accorded to a guidance document, such as NUREG-1801.<sup>39</sup>

## **B. The Reasonable Assurance Standard**

For safety issues, pursuant to Section 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.<sup>40</sup>

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.<sup>41</sup> Rather, the Commission takes a case-by-case approach, applying sound technical judgment and verifying the applicant’s compliance with Commission regulations.<sup>42</sup>

## **C. Enforceability of Commitments**

Licensee commitments are a well-established mechanism for ensuring that licensees implement their AMPs in a timely and effective manner.<sup>43</sup> Part 54 specifically authorizes

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<sup>38</sup> *Entergy Nuclear Vt. Yankee, LLC* (Vt. Yankee Nuclear Power Station), CLI-10-17, 72 NRC 1, 36 (2010).

<sup>39</sup> *See id.* at 32 n.185; *Seabrook*, CLI-12-05, slip op. at 16 n.78.

<sup>40</sup> 10 C.F.R. § 54.29(a).

<sup>41</sup> *AmerGen Energy Co. LLC* (License Renewal for 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”).

<sup>42</sup> *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).

<sup>43</sup> *See Vt. Yankee*, CLI-10-17, 72 NRC at 37 (“An applicant may commit to implement an AMP that is consistent with [NUREG-1801] and that *will* adequately manage aging.”).

licensees to demonstrate compliance with its requirements by committing to take prospective actions after the NRC issues the renewed license. This compliance method is well-established in NRC regulatory practice.<sup>44</sup> It dates back to the original license renewal rule in 1991, when the Commission accepted the use of new commitments to monitor, manage, and correct age-related degradation unique to license renewal. The Commission at that time stated:

The licensing basis for a nuclear power plant during the renewal term will consist of the current licensing basis and *new commitments* to monitor, manage, and correct age-related degradation unique to license renewal, as appropriate. The current licensing basis includes all applicable NRC requirements and licensee commitments, as defined in the rule.<sup>45</sup>

In its 1995 revised rule, the Commission reiterated that such commitments are acceptable.<sup>46</sup>

More recently, the Commission affirmed these important principles in the *Vermont Yankee* license renewal proceeding. In CLI-10-17, the Commission held:

[I]n Oyster Creek, we expressly interpreted section 54.21(c)(1) to permit a demonstration after the issuance of a renewed license: “an 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.” We reiterate here that 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).<sup>47</sup>

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<sup>44</sup> See, e.g., 10 C.F.R. § 54.29 (stating “actions have been identified and have been *or will be taken*” with respect to managing the effects of aging and TLAAs) (emphasis supplied); see also *Turkey Point*, CLI-01-17, 54 NRC at 8 (“Part 54 requires renewal applicants to demonstrate how their programs *will be effective in managing the effects of aging during the proposed period of extended operation*. . . . Applicants must identify any *additional actions, i.e.,* maintenance, replacement of parts, etc., *that will need to be taken* to manage adequately the detrimental effects of aging.”) (emphasis added) (citations omitted) .

<sup>45</sup> Final Rule; Nuclear Power Plant License Renewal, 56 Fed. Reg. 64,943, 64,946 (Dec. 13, 1991) (emphasis added).

<sup>46</sup> See Final Rule; Nuclear Power Plant License Renewal; Revisions, 60 Fed. Reg. 22,461 22,473 (May 8, 1995) (stating that, for the license renewal review, consideration of *written commitments* only need encompass those commitments that concern the capability of systems structures and components, identified in § 54.21(a), integrated plant assessment and §54.21(c) time-limited aging analyses, to perform their intended functions, as delineated in § 54.4(b)).

<sup>47</sup> *Vt. Yankee*, CLI-10-17, 72 NRC at 36 (citing *Oyster Creek*, CLI-08-23, 68 NRC at 468).

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 under Section 54.29(a).

**D. Burden of Proof**

An applicant has the burden of proof in a licensing proceeding.<sup>48</sup> But intervenors have the initial “burden of going forward”; that is, they must provide sufficient evidence to support the claims made in the admitted contention.<sup>49</sup> This burden of going forward applies at hearing, even after a contention is admitted.<sup>50</sup> For example, in the *Oyster Creek* license renewal proceeding, the Commission upheld a Board ruling that the intervenors had not met their burden at the hearing stage because their claims were unsupported allegations and mere speculation.<sup>51</sup> If the intervenors do carry their burden of going forward with a *prima facie* case on particular issues, then the applicant has the burden of satisfying the Board that it should reject the contention on its

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<sup>48</sup> See 10 C.F.R. § 2.325.

<sup>49</sup> *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.”); see also *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 554 (1978) (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).

<sup>50</sup> See *Oyster Creek*, CLI-09-7, 69 NRC at 268-70.

<sup>51</sup> See *id.* at 269; *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).



merits.<sup>52</sup> To prevail, the applicant's position must be supported by a preponderance of the evidence.<sup>53</sup>

#### IV. ARGUMENT

##### A. Energy's Witnesses

Entergy's testimony on NYS-6/7 is provided by the witnesses identified below. The testimony, evidence, and opinions these Entergy witnesses present are based on their technical and regulatory expertise, professional experience, and personal knowledge of the issues raised in NYS-6/7. Collectively, these witnesses demonstrate that NYS-6/7 lacks merit.

##### 1. Mr. Alan B. Cox

Mr. Cox is Entergy's Technical Manager, License Renewal. As summarized in his testimony,<sup>54</sup> Mr. Cox has more than 34 years of experience in the nuclear power industry, having served in various positions related to nuclear power plant engineering and operations. For example, from 1993 to 1996, he was employed as a Senior Staff Engineer at Arkansas Nuclear One ("ANO"). From 1996 to 2001, he served as the Supervisor, Design Engineering, at ANO. Mr. Cox was licensed by the NRC in 1981 as a reactor operator and in 1984 as a senior reactor operator for ANO. Mr. Cox has been a member of the Nuclear Energy Institute ("NEI") License Renewal Task Force since approximately 2002 and previously have 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

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<sup>52</sup> See, e.g., *Waterford*, ALAB-732, 17 NRC at 1093 (citing *Midland*, ALAB-123, 6 AEC at 345).

<sup>53</sup> *Pac. Gas & Elec. Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-763, 19 NRC 571, 577 (1984).

<sup>54</sup> See Entergy Test at A2-4 (ENT000233).

from the University of Oklahoma and a Masters of Business Administration (“M.B.A.”) from the University of Arkansas at Little Rock.

As Technical Manager, Mr. Cox was directly involved in preparing the LRA (submitted in April 2007) and developing or reviewing aging AMPs for IP2 and IP3. Those programs include the Inaccessible Cable Program and the Cables and Connections Program. Mr. Cox was directly involved in developing or reviewing Entergy responses to NRC Staff requests for additional information (“RAIs”) concerning the LRA and various revisions to the application (principally as they relate to aging management issues). In addition, he supported Entergy at the related Advisory Committee on Reactor Safeguards (“ACRS”) Subcommittee and Full Committee meetings for the IPEC LRA held in March 2009, and in September 2009, respectively.

2. Mr. Roger B. Rucker

Mr. Rucker is an independent Engineering Consultant in Russellville, Arkansas who focuses on electrical and instrumentation and control (“I&C”) applications in nuclear power plants, particularly as they relate to license renewal. As summarized in his testimony,<sup>55</sup> Mr. Rucker 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. He is Entergy’s representative for the NEI License Renewal Electrical Working Group. Previously, Mr. Rucker was a member of NEI, EPRI, and Institute of Electrical and Electronics Engineers (“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

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<sup>55</sup> *Id.* at A6-8.

several industry guidance documents related to cables, including: EPRI Report No. 1013475, “Plant Support Engineering: License Renewal Electrical Handbook - Rev. 1 to EPRI Report 1003057” (Feb. 2007); NEI 06-05, “Medium Voltage Underground Cable White Paper” (Apr. 2006) (“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). Mr. Rucker holds a B.S. degree in Electrical Engineering from the University of Arkansas.

Mr. Rucker provides technical services to Entergy’s License Renewal Services Division at its ANO office and is the License Renewal Electrical Lead for several Entergy nuclear power plant license renewals (including IPEC license renewal). Mr. Rucker prepared several documents that support the IPEC LRA. Those documents include the electrical AMR report, as well as the electrical portions of the (1) AMP evaluation report, (2) scoping and screening report, and (3) operating experience review reports. Mr. Rucker also has performed cable inspections at IPEC.

3. Mr. Thomas S. McCaffrey

Mr. McCaffrey is employed by Entergy as the Design Engineering Manager at IPEC. He is responsible for the design engineering staff that maintains the IP2 and IP3 design bases and performs plant modifications for the station. As summarized in his testimony,<sup>56</sup> 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/I&C Systems Supervisor, and Electrical/I&C Systems Manager. From 2005 to 2007, Mr. McCaffrey

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<sup>56</sup> *Id.* at A10-12.

worked at the Institute of Nuclear Power Operations (“INPO”), reviewing nuclear power plant equipment performance. Mr. McCaffrey holds a Bachelor of Science degree in Electrical Engineering from the State University of New York – Maritime College.

4. Dr. Howard G. Sedding

Dr. Sedding is employed as the Department Manager, Electrical Safety & Testing by Kinectrics Inc. (formerly Ontario Hydro Research Division), in Toronto, Canada. Kinectrics is an engineering firm that provides technology services to electric utilities, power equipment manufacturers, and large electrical energy end-users.. As summarized in his testimony,<sup>57</sup> Dr. Sedding 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. He holds a Bachelor of Science 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 in Electrical Engineering and Applied Physics from Brighton Polytechnic (now the University of Brighton) in Brighton, England.

Since joining Kinectrics, Dr. Sedding has been involved in, or responsible for, numerous projects related to the 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.

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<sup>57</sup> *Id.* at A14-16.

Dr. Sedding has also 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.

**B. Entergy’s Evidence**

In their testimony, Entergy’s experts demonstrate that the IPEC LRA provides sufficient detail about Entergy’s Inaccessible Cable Program and Cables and Connections Program, and why those programs provide reasonable assurance that IPEC will adequately manage the effects of aging on cable functionality during the extended operation period. As summarized below, Entergy’s experts also address the criticisms presented in Mr. Bascom’s prefiled testimony and report concerning NYS-6/7, and demonstrate that those criticisms lack merit.

1. Contrary to NYS’s Claim, Entergy Has Fully Disclosed Its AMP for Non-EQ Inaccessible Medium- and Low-Voltage Cables

In its LRA, Entergy described its proposed Inaccessible Cable Program as being equivalent to Section XI.E3 of NUREG-1801, Rev. 1.<sup>58</sup> NYS’s criticism of the lack of detail in the LRA<sup>59</sup> does not take into account the most critical details of the LRA’s description of the

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<sup>58</sup> See Entergy Test. at A55 (ENT000233).

<sup>59</sup> See Bascom Test. at 5, 34-35 (NYS00136).

Inaccessible Cable Program. The descriptions in Appendix B of the LRA follow the convention established in Appendix D of NEI 95-10, “Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” Rev. 6 (June 2005) (ENT000098). Under that convention, the IPEC LRA described the Inaccessible Cable Program as being consistent with NUREG-1801.<sup>60</sup> The LRA’s description of this program indicates that the IPEC program is, in essence, the exact program that the NRC staff had reviewed and approved in NUREG-1801, Rev. 1.

Furthermore, since the admission of NYS-6/7, Entergy has provided substantial additional information about the Inaccessible Cable Program, including supporting documentation and implementing procedures discussed herein, through docketed submittals to the NRC and mandatory disclosures to NYS. Entergy also expanded the program’s scope to include low-voltage power cables (400V to 2kV).<sup>61</sup> In addition, Entergy’s fleet-wide Cable Reliability Program procedure (EN-DC-346) provides additional details concerning the Inaccessible Cable Program’s implementation.<sup>62</sup>

2. NRC License Renewal Regulations and Guidance Do Not Require The Level of Detail NYS Claims Is Necessary

NYS and Mr. Bascom assert that Entergy’s Inaccessible Cable Program is “missing” the following “critical details”: (1) the location or number of the relevant cables; (2) identification of their function or the criticality of the systems they serve; (3) description of their physical characteristics (*i.e.*, the age of the in-scope cable circuits, the number of cable circuits, the lengths of cable circuits, the voltage class of the cables, and the types of cables, including

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<sup>60</sup> See Entergy Test. at A89 (ENT000233).

<sup>61</sup> *Id.* at A56.

<sup>62</sup> See EN-DC-346 (ENT000237).

insulation types); (4) explanation of the corrective actions Entergy will take if manhole inspections reveal periodic water accumulation; (5) explanation of the cable condition monitoring tests Entergy will use; (6) explanation of the criteria for determining whether a cable passes or fails a condition monitoring test; and (7) identification of what corrective actions, if any, Entergy will take if a defective cable is found.<sup>63</sup>

As an initial matter, there is no NRC regulation or guidance that calls for the inclusion of the details Mr. Bascom demands.<sup>64</sup> His testimony also appears to conflate the Inaccessible Cable Program's adequacy (in relation to Part 54 requirements) with the adequacy of that program's actual implementation (as verified through post-license renewal inspection processes).

With respect to the Inaccessible Cable Program's adequacy, as part of its technical review of the IPEC LRA, the NRC Staff performed extensive onsite audits and inspections to review IPEC documentation supporting the application, to address issues identified during the Staff's LRA review, and to verify consistency of IPEC's Inaccessible Cable Program with the corresponding NUREG-1801 program (*i.e.*, that Entergy's program contains the program elements of the NUREG-1801 program, and that the conditions at IPEC are bounded by the conditions for which the NUREG-1801 program was evaluated).<sup>65</sup> As documented in its safety evaluation reports, the Staff found the level of detail in IPEC's Inaccessible Cable Program to be acceptable.<sup>66</sup>

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<sup>63</sup> Bascom Test. at 5, 34-35 (NYS000136).

<sup>64</sup> Entergy Test. at A96 (ENT000233).

<sup>65</sup> See NUREG-1930, Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generation Units Nos. 2 and 3, at 3-31 to -33 (Nov. 2009) ("SER") (NYS00326B) (NYS00326B); Supplemental SER at 3-5 to -9 (NYS000160).

<sup>66</sup> See SER at 3-31 to -33 (NYS00326B); Supplemental SER at 3-5 to -9 (NYS000160).

As part of this technical review, the NRC Staff did not, however, review the adequacy of Entergy’s actual implementation of the Inaccessible Cable Program. Rather, the Staff reviews Entergy’s implementation of the Inaccessible Cable Program and other AMPs through a separate process—the NRC Staff’s license renewal inspection process.<sup>67</sup> Before extended operation begins, NRC regional staff perform an inspection in accordance with the guidance in NRC Inspection Manual Chapter 71003, “Post-Approval Site Inspection for License Renewal” (ENT000251).<sup>68</sup> The Inspection Procedure 71003 process includes “[verification] that license conditions added as part of the renewed license, license renewal commitments, selected aging management programs, and license renewal commitments revised after the renewed license was granted, are implemented in accordance with [10 C.F.R. Part 54].”<sup>69</sup> It also verifies that descriptions of AMPs and related activities are, or will be, contained in the Updated Final Safety Analysis Report (“UFSAR”), and that the descriptions are consistent with the programs the licensee is implementing.<sup>70</sup> As part of this process, the NRC Staff review program documents, instructions, or procedures that the licensee has committed to follow in implementing its AMPs.<sup>71</sup>

### 3. IPEC’s Inaccessible Cable Program Is Not “Missing” Any “Critical” Details

Contrary to NYS’s and Mr. Bascom’s claim, Entergy’s Inaccessible Cable Program includes sufficient detail to comply with applicable regulatory requirements and guidance.

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<sup>67</sup> Entergy Test. at A97 (ENT000233).

<sup>68</sup> *Id.*

<sup>69</sup> *Id.*

<sup>70</sup> *Id.*

<sup>71</sup> *Id.* The NRC Staff issued Temporary Instruction 2516/001(Mar. 30, 2011) (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. *Id.* NRC Region I inspectors completed an inspection at IP2 under Temporary Instruction 2516/001 during the week of March 5 to 9, 2012. *Id.*



Entergy fleet procedure EN-DC-346 incorporates IPEC license renewal requirements and commitments and is being used to implement the IPEC Inaccessible Cable Program.<sup>72</sup> EN-DC-346 requires responsible IPEC personnel to develop 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.<sup>73</sup> Entergy recently developed these lists in accordance with EN-DC-346.<sup>74</sup>

With respect to potential water accumulation, the Inaccessible Cable Program, in addition to IPEC's current Part 50 preventive maintenance program, requires periodic actions to minimize cable exposure to significant moisture, such as inspecting for water collection in cable manholes and removing water as needed.<sup>75</sup> Consistent with NUREG-1801, possible corrective actions include, but are not limited to, installing permanent drainage systems or sumps, installing water-level monitors/alarms, more frequent cable testing or manhole inspections, checking cable/splices for anomalies, and replacing degraded cable sections.<sup>76</sup>

Contrary to NYS's claim that Entergy has not identified the tests or the acceptance criteria that it will use to monitor cable conditions,<sup>77</sup> procedure EN-DC-346 specifies the use of two diagnostic tests – the “tan delta” test and the very low frequency (“VLF”) alternating current

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<sup>72</sup> *Id.* at A98.

<sup>73</sup> *Id.* at A99.

<sup>74</sup> See IPEC In-Scope Low-Voltage In-Scope Cable List (ENT000242); IPEC Medium-Voltage In-Scope Cable List (ENT000243).

<sup>75</sup> Entergy Test. at A103 (ENT000233).

<sup>76</sup> NUREG-1801, Rev. 2, at XI E3-3 (NYS00147D).

<sup>77</sup> See Bascom Test. at 5 (NYS00136).

high potential (“hi-pot”) test – for shielded medium-voltage cables, as well as the test acceptance criteria.<sup>78</sup> The procedure also contemplates use of other industry-recommended methods for cable condition monitoring and aging assessment of shielded medium-voltage cables subject to long-term wetting at the time actual tests and assessments are performed.<sup>79</sup> Entergy’s selection of VLF hi-pot and tan delta testing for medium-voltage cables is consistent with electric utility industry practices in general and nuclear power plants in particular.<sup>80</sup> For low-voltage cables, procedure EN-DC-346 specifies using periodic inspections and insulation resistance testing.<sup>81</sup>

Further, as discussed in the LRA program, and consistent with IPEC’s current operations, if inspection or test results do not meet applicable acceptance criteria, corrective actions are determined through an evaluation performed in accordance with the IPEC corrective action program.<sup>82</sup> For instance, Section 5.4 (Actions for Shielded Medium-Voltage Underground Cables), Section 5.5 (Actions for Unshielded Medium-Voltage Underground Cables), and Section 5.6 (Actions for Low Voltage Underground Power Cables) of procedure EN-DC-346 identify possible cable-specific corrective actions. Such actions include, for example, more frequent cable testing, checking cable/splices for anomalies, and replacing degraded cable sections.

4. An Independent Expert Review of IPEC’s Inaccessible Cable Program Confirms that the Program Provides the Requisite Reasonable Assurance

Entergy asked Dr. Sedding, an expert with over 28 years of experience related to testing, condition monitoring and assessment of cable insulation materials (including those used at

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<sup>78</sup> Entergy Test. at A113, A117 (ENT000233).

<sup>79</sup> *Id.*

<sup>80</sup> *Id.* at A114.

<sup>81</sup> *Id.* at A115.

<sup>82</sup> *Id.* at A118.

nuclear power plants), to review IPEC’s Inaccessible Cable Program to evaluate whether it complies with NRC requirements/licensee commitments, in particular, and technical requirements in general.<sup>83</sup> As part of his review, Dr. Sedding considered, among other things, the specific cable designs in use at IPEC, IPEC operating experience, and Entergy’s Inaccessible Cable Program and implementing procedure EN-DC-346.<sup>84</sup> As noted in his testimony, Dr. Sedding concluded that IPEC’s program “is comprehensive and contains the required elements of a credible and robust methodology for cable aging management, including periodic manhole monitoring/dewatering and cable testing, for the extended 20-year renewal period.”<sup>85</sup> Dr. Sedding also found that the Inaccessible Cable Program incorporated, and was consistent with, the appropriate industry guidance documents.<sup>86</sup>

In addition, Dr. Sedding noted that the vast majority of in-scope IPEC cable systems were installed with lead sheaths, which he found significant, because the presence of an intact lead sheath serves as a water-impervious barrier.<sup>87</sup> Based on the presence of lead sheaths in the vast majority of in-scope cable systems, Dr. Sedding concluded that the probability of cable insulation degradation due to “water treeing” in these cables is low.<sup>88</sup> This conclusion is supported by IPEC operating experience, which shows that there have been no observed aging-related cable failures or faults at IPEC to date.<sup>89</sup> This operating experience indicates that the

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<sup>83</sup> *Id.* at A72.

<sup>84</sup> *Id.*

<sup>85</sup> *Id.*

<sup>86</sup> *Id.*

<sup>87</sup> *Id.*

<sup>88</sup> *Id.* “Water trees” (also called electrochemical trees) are water-filled, tree-shaped formations that weaken the cable insulation by causing a decrease in the insulation’s strength. *See id.* at A41.

<sup>89</sup> *Id.* at A66.

installed cables are of good quality and/or are not exposed to environments conducive to the growth of water trees.<sup>90</sup>

With respect to the specific medium-voltage and low-voltage cable tests identified in implementing procedure EN-DC-346, Dr. Sedding concluded that tan delta and VLF hi-pot testing for medium-voltage cables and insulation resistance/motor current testing for low-voltage cables and the acceptance criteria selected by Entergy are appropriate for their intended purposes.<sup>91</sup> He noted that Entergy's procedure also contemplates the use of industry-recommended methods at the time the tests are performed, which allows for any necessary adjustments to cable testing methods and acceptance criteria as the state-of-the-art evolves.<sup>92</sup>

Further, Dr. Sedding reviewed the Inaccessible Cable Program testing frequency, and determined that, based on the design characteristics and operating experience of the in-scope IPEC medium-voltage and low-voltage cables, the program's minimum testing frequency of at least once every six years, as recommended by the NRC in NUREG-1801, is adequate.<sup>93</sup> In addition, he concluded that Entergy's program is capable of detecting the types of degradation mechanisms known to affect underground cables that may be subject to long-term wetting.<sup>94</sup> In conclusion, Dr. Sedding determined that Entergy's Inaccessible Cable Program, if implemented in accordance with EN-DC-346, provides the reasonable assurance required by the NRC.<sup>95</sup>

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<sup>90</sup> *Id.* at A72.

<sup>91</sup> *Id.*

<sup>92</sup> *Id.*

<sup>93</sup> *Id.*

<sup>94</sup> *Id.*

<sup>95</sup> *Id.*

5. Entergy Has A Separate Program To Manage Aging Effects On Non-EQ Inaccessible Power Cables Exposed To Adverse Localized Environments

Contrary to NYS's assertion in NYS-7, Entergy does not lack a program for non-EQ inaccessible power cables exposed to ALEEs.<sup>96</sup> The IPEC Cables and Connections Program encompasses all aboveground non-EQ low-voltage and medium-voltage cables performing license renewal intended functions. Under the implementing procedure for the Cables and Connections Program (EN-DC-348, "Non-EQ Insulated Cables and Connections Inspection"), *all* accessible plant areas are examined for possible ALEEs, and all accessible cables are visually inspected for insulation or jacket surface anomalies, regardless of whether they are located in or near an ALEE.<sup>97</sup> The IPEC corrective action process is used to evaluate *inaccessible* cables located in an ALEE and to determine if further actions are needed.<sup>98</sup> Specifically, if an unacceptable condition or situation is identified during a visual inspection of an accessible cable, then the procedure requires Entergy to determine whether the same condition or situation is applicable to other cables or connections (accessible and inaccessible).<sup>99</sup> If it is applicable, then the procedure calls for appropriate corrective action to be taken.<sup>100</sup> Potential corrective actions include testing cables, shielding cables (or otherwise changing their environments), or relocating or replacing the affected cables or connections.<sup>101</sup>

Although Entergy's Non-EQ Insulated Cables and Connections Program considers temperature-related degradation, Mr. Bascom's specific claims regarding thermal degradation

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<sup>96</sup> See Bascom Test. at 30-31 (NYS000136).

<sup>97</sup> Entergy Test. at A79 (ENT000233).

<sup>98</sup> *Id.*

<sup>99</sup> *Id.*

<sup>100</sup> *Id.*

<sup>101</sup> *Id.*

are irrelevant to the issues raised in NYS-7 for several reasons.<sup>102</sup> First, it is unreasonable to assume that a cable that has been fulfilling its intended function for nearly 40 years will suddenly be subjected to conditions that will increase its temperature from 90° to 150°C (as suggested in Mr. Bascom's Report, at 28-29), and that this temperature will be maintained to the point that it will destroy the cable in a few months.<sup>103</sup> The examples of adverse temperature environments cited by Mr. Bascom are exaggerated and unrealistic.<sup>104</sup> In nuclear power plants such as IP2 and IP3, temperatures reaching 194°F (90°C), much less temperatures approaching 302°F (150°C),<sup>105</sup> do not occur without an abnormal condition or event.<sup>106</sup> IPEC's corrective action process requires Entergy to evaluate such abnormal events, implement corrective actions, and conduct appropriate evaluations of affected components.<sup>107</sup> In fact, under EN-DC-348, Entergy uses 112°F as the temperature threshold for using the corrective action program to further investigate a potential adverse localized temperature environment.<sup>108</sup>

Further, the case cited by Mr. Bascom (an example of thermal degradation of cables in Auckland, New Zealand) does not apply to cables installed at a nuclear power plant.<sup>109</sup> The cables that caused the outage in Auckland, New Zealand were high-voltage self-contained cables.<sup>110</sup> That cable type has a laminated, paper insulation over a central, hollow conductor

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<sup>102</sup> See Bascom Test. at 29-34 (NYS000136).

<sup>103</sup> Entergy Test. at A124 (ENT000233).

<sup>104</sup> *Id.*

<sup>105</sup> See Bascom Report at 28-29 (NYS000136).

<sup>106</sup> Entergy Test. at A124 (ENT000233).

<sup>107</sup> *Id.*

<sup>108</sup> *Id.*

<sup>109</sup> See Bascom Report at 27 (NYS000138).

<sup>110</sup> Integral Energy Austl., Inquiry into the Auckland Power Failure, Technical Report on Cable Failures Integral Energy at (May 5, 1998) (NYS000155).

through which the insulating oil circulates and that, in the case of a break in the lead sheath, can supply a large amount of pressurized flammable liquid to feed a fire.<sup>111</sup> In contrast, cables in U.S. nuclear power plants (including IP2 and IP3) typically have extruded polymer insulation that cannot lose their insulating or cooling values due to failure of an active system.<sup>112</sup>

6. Entergy Has Sufficient Time to Complete the Necessary Tests and Inspections of Medium-Voltage and Low-Voltage Cables Before the Period of Extended Operation Begins

Finally, NYS's suggestion that Entergy will not have sufficient time to test all cables within the scope of the Inaccessible Cable Program before the IP2 operating license expires in September 2013 is incorrect.<sup>113</sup> Entergy has committed to complete the necessary testing of underground medium-voltage and low-voltage cables listed in Exhibits ENT000242 and ENT000243 before the extended operation period begins and, to that end, has developed an appropriate work plan and schedule to meet that regulatory commitment.<sup>114</sup> As shown in ENT000243, there are only five medium-voltage circuits with a license renewal intended function. Entergy has completed tan delta testing on the IP2 13.8 kV feeder cables.<sup>115</sup> The IP3 13.8 kV feeder cable testing is scheduled to be conducted in the first quarter of 2013, and the remaining IP2 and IP3 6.9 kV circuits are scheduled to be tested prior to the end of 2012.<sup>116</sup> All of the low-voltage cables listed in Exhibit ENT000242 have already been tested using insulation resistance/motor current analysis techniques.<sup>117</sup> Thus, contrary to Mr. Bascom's suggestion,

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<sup>111</sup> Entergy Test. at A124 (ENT000233).

<sup>112</sup> *Id.*

<sup>113</sup> Bascom Test. at 25-26 (NYS00136).

<sup>114</sup> Entergy Test. at A120 (ENT000233).

<sup>115</sup> *Id.*

<sup>116</sup> *Id.*

<sup>117</sup> *Id.* at A120, A115.

Entergy has appropriate plans and schedules in place to complete the remaining testing and to evaluate the test results before IP2 and IP3 enter their respective extended operation periods.

With respect to inspections, Entergy has already completed the necessary inspections of accessible non-EQ medium- and low-voltage cables at IPEC.<sup>118</sup> In July to August of 2010, Entergy completed non-outage walkdowns of IP2 and IP3 non-EQ cables and connections using procedure EN-DC-348 to identify and document any ALEEs and visually inspect accessible cables and connections for any signs of degradation.<sup>119</sup> Entergy also conducted outage walkdowns of IP3 non-EQ cables and connections during the 3R16 refueling outage in March 2011.<sup>120</sup> The IP2 outage walkdowns recently were completed during the 2R20 refueling outage in March 2012.<sup>121</sup> A walkdown inspection plan was used to inspect each area of the plants, which identified the areas with potential ALEEs, and provided a guide for visually inspecting accessible non-EQ insulated electrical cables and connections.<sup>122</sup> In accordance with EN-DC-348, Entergy is preparing a Cable and Connection Inspection Summary Report, which will document the results of the walkdown inspections discussed above.<sup>123</sup>

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<sup>118</sup> *Id.* at A127.

<sup>119</sup> *Id.*

<sup>120</sup> *Id.*

<sup>121</sup> *Id.*

<sup>122</sup> *Id.* at A128.

<sup>123</sup> *Id.* at A129.



**C. NYS Has Not Met Its Evidentiary Burden**

1. Entergy Has Adequate Aging Management Programs to Manage Aging Effects on Non-EQ Inaccessible Low- and Medium-Voltage Cables

NYS has not carried its burden of providing sufficient evidence to support its claims that Entergy has failed “to provide an adequate and specific program to manage the effects of aging on [non-EQ] inaccessible low- and medium-voltage power cables that are exposed to adverse localized environmental conditions.”<sup>124</sup> Entergy has proffered more than sufficient evidence to show that its Inaccessible Cable Program and Cables and Connections Program meet all regulatory requirements and NUREG-1801 guidelines, include the requisite level of detail, and are being implemented in accordance with Entergy’s regulatory commitments and fleet procedures.

2. The NRC Staff’s Review of Entergy’s AMPs Supports a Finding of Reasonable Assurance that Entergy Will Manage Aging Effects on Non-EQ Inaccessible Low- and Medium-Voltage Cables During the Extended Operation Period

As documented in its Safety Evaluation Report (“SER”) and Supplemental SER for IPEC, the NRC Staff performed a detailed review of Entergy’s Inaccessible Cable Program.<sup>125</sup> Specifically, the Staff found that the program was consistent with Section XI.E3 of NUREG-1801, Rev. 1, in addition to current industry operating experience and NRC recommendations.<sup>126</sup> Based on its findings, the Staff concluded that Entergy had demonstrated that it will adequately manage the pertinent aging effects so that the intended function(s) will be maintained consistent

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<sup>124</sup> NYS Statement of Position at 1.

<sup>125</sup> SER at 3-31 to -33 (NYS00326B); Supplemental SER at 3-5 to 3-9 (NYS000160).

<sup>126</sup> Supplemental SER at 3-9.

with the current licensing basis during extended operations, as required by 10 C.F.R. § 54.21(a)(3).<sup>127</sup>

The Staff also performed a detailed review of Entergy's Cables and Connections Program.<sup>128</sup> Based on its audit and review of that program, the Staff found all program elements to be consistent with NUREG-1801 program elements.<sup>129</sup> With respect to this program, the Staff concluded that Entergy has demonstrated that the effects of aging will be adequately managed so that its intended functions will be maintained consistent with the IP2 and IP3 CLBs for the period of extended operation, as required by 10 C.F.R. § 54.21(a)(3).<sup>130</sup>

As discussed above, the applicable standard that must be met for safety issues such as those raised in NYS-6/7 is *reasonable assurance*.<sup>131</sup> Under Commission precedent, Entergy's use of AMPs consistent with NUREG-1801 – as confirmed by the NRC Staff – constitutes reasonable assurance that it will manage aging effects on non-EQ inaccessible low- and medium-voltage cables during the renewal period.<sup>132</sup>

## V. CONCLUSION

As summarized above, Entergy's testimony demonstrates that IPEC's Inaccessible Cable Program and Cables and Connection Program meet all applicable regulatory requirements and provide reasonable assurance that aging effects on all low- and medium-voltage cables within the scope of those programs can be adequately managed during the period of extended operation.

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<sup>127</sup> *Id.*

<sup>128</sup> *See* Entergy Test. at A88 (ENT000233).

<sup>129</sup> SER, Vol. 2 at 3-38.

<sup>130</sup> *Id.*

<sup>131</sup> 10 C.F.R. § 54.29(a).

<sup>132</sup> *See Oyster Creek*, CLI-08-23, 68 NRC at 468.

NYS has not carried its burden of providing sufficient evidence to support the claims made in NYS-6/7. Accordingly, NYS-6/7 should be resolved in Entergy's favor.

Respectfully submitted,

*Signed (electronically) by Paul M. Bessette*

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Dated in Washington, D.C.  
this 29th day of March 2012