

UNITED STATES

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In re: Docket Nos. 50-247-LR; 50-286-LR

License Renewal Application Submitted by ASLBP No. 07-858-03-LR-BD01

Entergy Nuclear Indian Point 2, LLC, DPR-26, DPR-64

Entergy Nuclear Indian Point 3, LLC, and

Entergy Nuclear Operations, Inc. June 27, 2012

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PRE-FILED WRITTEN REBUTTAL TESTIMONY OF

EARLE C. BASCOM III REGARDING CONTENTIONS NYS-6 AND NYS-7

On behalf of the State of New York ("NYS" or "the State"), the Office of the Attorney General hereby submits the following rebuttal testimony by Earle C. Bascom III regarding Contentions NYS-6 and NYS-7.

Q. What documents did you review in preparation for your rebuttal testimony?

A. I read Entergy's Statement of Position Regarding Contention NYS-6 and 7; the testimony of Entergy witnesses Alan B. Cox, Roger B. Rucker, Thomas S. McCaffrey and Howard G. Sedding concerning NYS-6 and 7 and exhibits thereto ("Entergy Testimony"). I have also read NRC Staff's Statement of Position

1 on Contention NYS-6 and 7 and the testimony of NRC witnesses
2 Cliff Douth and Duc Ngyuen and exhibits thereto ("Staff
3 Testimony").

4 Q. Have you reviewed Entergy's Cable Reliability Program
5 issued on June 11, 2011 (ENT000237)?

6 A. Yes.

7 Q. What is your opinion of the ability of the Cable
8 Reliability Program to manage the effects of aging on
9 underground, non-environmentally qualified low and medium
10 voltage power cables exposed to significant moisture?

11 A. In my opinion, the Cable Reliability Program, if
12 followed, will adequately manage the effects of aging caused by
13 the exposure of these cables to significant moisture.

14 Q. What is the purpose of your rebuttal testimony?

15 A. My purpose is to reply to the assertions of Entergy's
16 and NRC Staff's expert witnesses, that there is no need for an
17 Aging Management Program ("AMP") to manage the aging effects
18 caused by heat or thermal stress on non-environmentally
19 qualified ("non-EQ") below grade low and medium voltage power
20 cables. According to Entergy and Staff, there is no need for
21 such an AMP because: (1) these below grade cables are not likely
22 to be near external heat sources, and therefore soil resistivity
23 tests are not technically warranted (Entergy Testimony at 79;

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1 Staff Testimony at 27); (2) cable degradation that might occur
2 due to internal (ohmic) heating is a design issue, not an aging
3 issue (Entergy Testimony at 79); and (3) NRC's research in the
4 areas of license renewal reviews and aging concerns "has not
5 shown" the effects of heat or thermal stress on these cables to
6 be a concern at operating plants (Staff Testimony at 26).

7 Q. Entergy's witnesses Alan Cox and Roger Rucker purport
8 to contradict your testimony (NYS000136 at 29-34) that Entergy
9 lacks an Aging Management Program for Non-EQ inaccessible power
10 cables that are exposed to adverse localized environments other
11 than moisture, such as excessive heat. Entergy Testimony at 74-
12 75. They characterize Entergy's Non-EQ Insulated Cables and
13 Connections Program as such a program. NUREG 1801 Rev. 2 *Generic*
14 *Aging Lessons Learned* ("GALL Rev 2") at XI E1-1. Does this
15 program include the aging management of cables exposed to an
16 adverse localized environment such as excessive heat that are
17 inaccessible because they are below grade or below ground?

18 A. No. The Non-EQ Insulated Cables and Connections
19 Program only includes above ground cables. Most of these cables
20 are accessible; above ground cables that are inaccessible are
21 located in conduits or other sheathing. Therefore, the majority
22 of the above ground cables can be visually inspected for damage
23 caused by adverse localized environmental conditions. If cable

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1 insulation degradation of above ground accessible cables is
2 discovered through visual inspection of those cables, then the
3 inaccessible cables in the same above ground areas can be
4 removed from the conduits and inspected. Thus, the Non-EQ
5 Insulated Cables and Connections program does not address cables
6 that are inaccessible because they are below ground and does
7 nothing to manage aging effects on below grade cables caused by
8 heat or thermal stress. Entergy's AMP that does include below
9 ground cables manages only the aging effects caused by exposure
10 to significant moisture, but not to heat or other localized
11 adverse environmental conditions. GALL Rev. 2 at XI E3-1

12 Q. In your initial testimony, you explained the
13 possibility of thermal degradation of the insulation of below
14 ground cables if the heat generated by the current cannot pass
15 out of the cable and into the surrounding soil because the
16 thermal resistance of the soil is too high Exh.NYS000136 at 30.
17 Entergy's witnesses Roger Rucker and Howard Sedding claim that
18 there is no reason to worry about the soil's thermal resistance
19 or to do soil resistivity tests because the cables have no
20 external heat source, such as a nearby steam pipe. Entergy
21 Testimony at 79. Is that an accurate statement?

22 A. No. The ohmic heating from a current flowing through a
23 conductor in a single cable can cause thermal degradation of the

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1 cable's insulation if the soil's thermal resistance is too high
2 for the heat to efficiently pass out of the cable and into the
3 soil. Although an external heat source in proximity to a cable
4 will exacerbate the insulation degradation, it is not a
5 necessary condition for the degradation to occur. For example,
6 if the soil thermal resistivity in which the cables are
7 installed is sufficiently great, the temperature rise caused by
8 the ohmic heat losses flowing radially away from the cable
9 through the soil by thermal conduction can raise the cable
10 temperature above the threshold where damage to the cable
11 insulation may occur.

12 Q. Entergy witnesses Roger Rucker and Howard Sedding
13 assert that "potential cable degradation caused by internal
14 (ohmic) heating, if it occurs, is a design issue not an aging
15 issue." Entergy Testimony at 79. Do you agree with that
16 assertion?

17 A. No. It is true that the likelihood of excessive ohmic
18 heating from a single cable can be minimized if the cable is
19 properly designed and properly installed. However, if a cable
20 experiences excessive temperatures due to ohmic heating because
21 it has not been properly designed or installed, then the
22 insulation degradation caused by that heating will only get
23 worse over time and may result in a breakdown of the insulation.

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1 In other words, increasing problems over time caused by an
2 initial design flaw is certainly an aging issue which must be
3 managed.

4 Q. In your initial testimony, you discussed the risk of
5 thermal stress, particularly for cables in underground conduits,
6 if other cables in close proximity to the subject cable cause
7 the temperature to rise in the vicinity of the subject cable,
8 resulting in a mutual heating effect. Exh.NYS 136 at 29-30.

9 Has either Entergy or NRC Staff addressed this issue in their
10 expert testimony?

11 A. No.

12 Q. Have you seen any evidence that underground cables at
13 the Indian Point Energy Center have been installed in close
14 proximity to each other?

15 A. Yes. An Entergy Condition Report dated 4/19/2012
16 reported that three manholes containing underground power cables
17 were filled to the top with water. Photographs annexed to the
18 report depict groups of 5 or 6 cable circuits in very close
19 proximity running through the same conduit to the same manhole.
20 See Exh.NYS000412.

21 Q. What is a "duct bank"?

22 A. A "duct bank" is a system of conduits in close
23 proximity installed in the same underground cable trench.

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1 Q. Are the cables in Exh.NYS000412 in close enough
2 proximity to each other to create a concern that a mutual
3 heating effect could cause cable insulation degradation?

4 A. Yes. Cables in such close proximity will certainly
5 experience mutual heating. The extent of the mutual heating and
6 ultimately the operating temperatures cannot be determined
7 without characterizing the soils and backfill in which the
8 cables are installed and without knowing the circuit loading on
9 all of the cables in the duct bank.

10 Q. Does this conclude your testimony?

11 A. Yes.

12 I have reviewed all the exhibits referenced herein. True
13 and accurate copies are attached.
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I, Earle C. Bascom III, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

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

W.C. Burrows

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