Exhibit B

Analysis of the Test Methods Used by Amperion to Test the BPL System Installed in Raleigh, NC

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1. Summary

1.1. In the comments it filed in ET Docket 04-37, "The Amendment of Part 15 Regarding New Requirements and Measurement Guidelines for Access Broadband Over Power Line Systems," Progress Energy provided information on the test methods that their BPL-equipment manufacturer (Amperion) used to verify their installation's compliance with FCC regulations for radiated emissions of carrier-current systems. There are a number of errors in the test procedure Amperion used to verify this system for compliance with Part 15 emissions limits. They include:

- The use of a spectrum analyzer that does not use a quasi-peak detector
- Use of a detector mode that undersamples the measured signal levels
- Use of a test antenna that has insufficient sensitivity over part of the measurement range
- Measurements made directly under the power lines
- Measurements made at a slant-range distance of less than 30 meters that are extrapolated to 30 meters using an extrapolation that is not accurate for line radiators

1.2. With all of these errors, ARRL does not believe that this system has been verified as required by Part 15 regulations. The total error that results from the ways that this system was improperly tested is as much as 25 dB.

2. Non Quasi Peak Detection

2.1. In its measurements, Amperion used a handheld spectrum analyzer – a Rohde and Schwarz model FSH3. This analyzer did not have a quasi-peak detector, so it cannot be used to make measurements per ANSI C63.4 as required by Part 15 rules. An applications note provided to ARRL by Rohde and Schwarz, "Fundamentals of Spectrum Analysis," states that significant dynamic range is required in a spectrum analyzer to make a quasi-peak measurement. While the FSH3 has sufficient dynamic range, the required quasi-peak functionality was not yet available for the unit used by Amperion.

> *"A special detector for interference pulse measurements referred to as a quasi-peak detector is frequently available as an option[1]. It places high demands on the*

[1] A quasi-peak detector first became available for the FSH3 on May 18, 2004 (firmware release 7.0). However, the instrument used by Amperion for testing on January 4, 2004 used an earlier firmware release.

dynamic range and linearity of the input as well as of the IF stage, which cannot be satisfied by a large number of instruments available on the market. The requirements are the result of the weighting characteristic for pulse sequences (prescribed by CISPR 16-1 standard) which, due to underweighting of pulse sequences at low pulse repetition frequency (up to 40 dB for single pulses), calls for a dynamic range that is wider than non-state-of-the-art instruments by a factor of 100."

3. Sample Mode Detector

3.1. The following figure is from the Amperion test data provided to the Commission by Progress Energy in its comment filing:

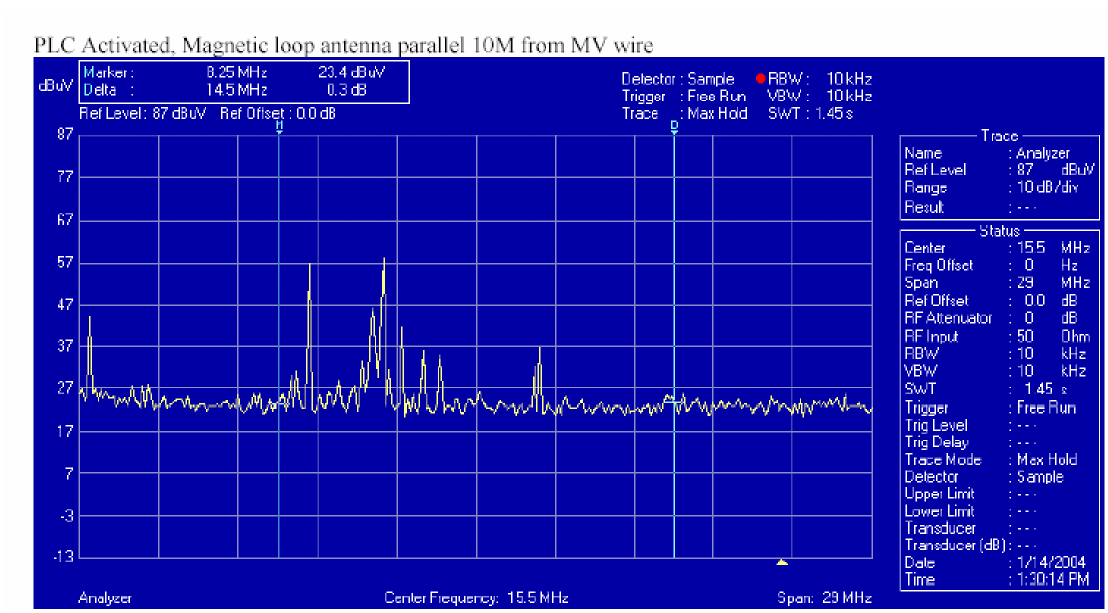

Figure B.1. This is one of the figures included the test results from Amperion's test-result report.

Figure B.2. This close-up shows that the “Sample” detector mode of the Rohde and Schwarz FSH-3 spectrum analyzer was used for these tests. This mode was used for all of the test results provided by Amperion.

3.2. In these tests, Amperion used the FSH3’s “sample” detector mode. The following information from the Rohde and Schwarz applications note explains how this will underestimate the measurement by a considerable amount:

“Sample Detector: The sample detector samples the IF envelope for each pixel of the trace to be displayed only once. Thus, it selects only one value from the samples allocated to a pixel as shown in Fig. 4-21[2] *to be displayed. If the span to be displayed is much greater than the resolution bandwidth (span/RBW > number of pixels on frequency axis), input signals are no longer reliably detected. The same unreliability apples when too large tuning steps of the local oscillator are chosen (see Fig. 4-5*[3]*). In this case, signals may not be displayed at the correct level or may be completely lost.”*

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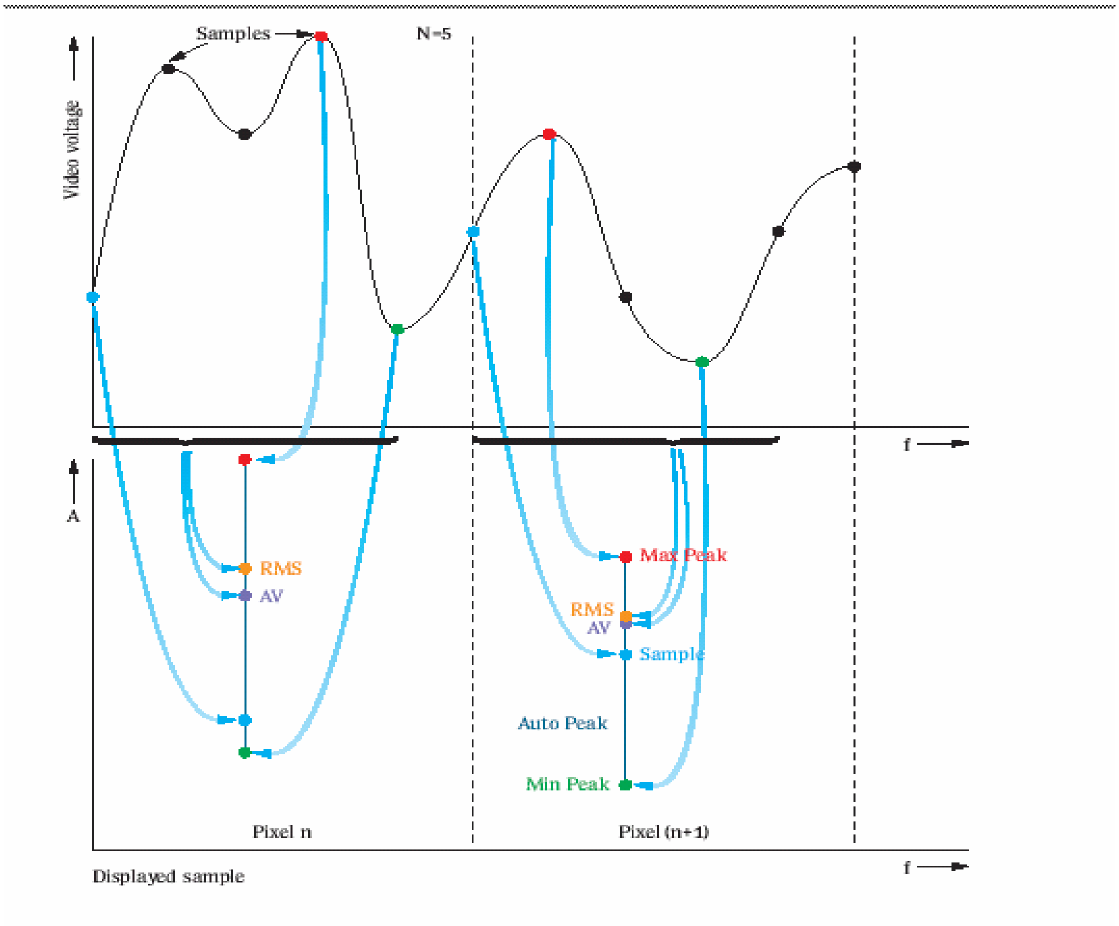
[2] Reproduced as Figure B.3 in this document.

[3] Fig 4-5 from the applications note is not reproduced in this document.



Figs 4-21 Selection of sample to be displayed as a function of detector used

Figure B.3. This figure, reproduced from Fig. 4-21 from the application note, shows the relationship between different detector modes available in many spectrum analyzers.

3.3. ARRL has an HP-8563E spectrum analyzer that has a sample-mode detector option. In tests of a single carrier, this detector measured the carrier at as much as 25 dB lower than the level of that carrier as indicated on the calibrated signal-generator source.

3.4. The use of a sample-mode detector to measure a BPL signal for compliance testing is a serious testing error that completely negates all of the results provided by Amperion for this system.

4. Test Antenna Sensitivity

4.1. ARRL is familiar with the AH Systems SAS-563B antenna that Amperion used for its tests, having used it for some of its BPL-system testing. This antenna is an amplified loop that has sufficient sensitivity at the upper end of its range to measure Part 15 level signals. At the lower end of its range, however, it lacks sensitivity. This can readily be seen by looking at any of the graphs that Amperion provided to Progress Energy. Other than a few of the very strongest ambient signals, the noise levels seen on the graph without the BPL signal present are generally uniform vs frequency. This does not match any of the information about the way that man-made noise levels are known to vary vs frequency[4]. This also does not match the antenna-factor data for the SAS-563B, which has a pronounced increase in its sensitivity near 13 MHz. These factors indicate that what is seen on the graphs are mostly the broadband noise of the spectrum analyzer or noise from the amplifier used in the antenna. In most of these graphs, the noise level does not increase in any significant way between the graphs labeled "PLC shutdown" and those labeled "PLC activated." This indicates that the measurements that were made were of signals that were below the noise level of the measurement instrumentation. This is not a sound measurement practice.

5. Measurements Made Directly Under the Overhead Power Lines

5.1 Amperion made its measurements directly underneath overhead power lines. Information provided by ARRL and Ameren Electric Corporation (AEC) in various filings in this procedure or the earlier Notice of Inquiry indicate that rather than increasing with decreasing distance, the fields in this region under the power line tend to not change with distance much at all. Figure B.4 shows the theoretical basis for that finding.

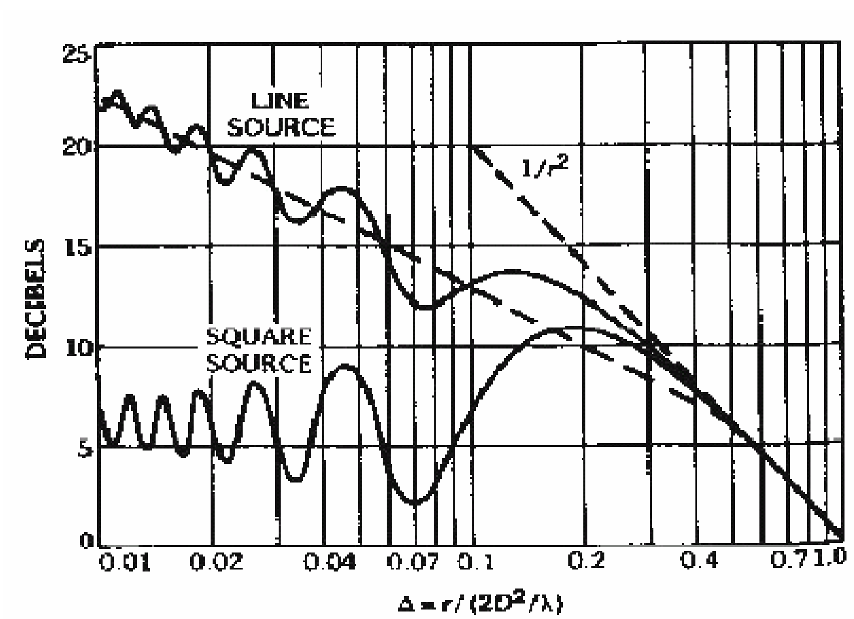


Figure B.4. This shows the on-axis power density perpendicularly away from a radiating line. The far-field power density varies as $1/r^2$. (The far electric or magnetic field strength varies as 1/r). Close to this physically large line source, the power density and *real* parts of the fields are less than the far-field 1/r relationship would predict.[5]

[4] This is described in great detail in Recommendation ITU-R P.372-8, Radio Noise, which shows man-made noise varying as a 26log(FMHz) function.

[5] From Ricardi, L.J. and Hansen, R.C, "Comparison of Line and Square Source Near Fields," *IEEE Trans. On Antennas and Propagation,* pp 711-712, November 1963.

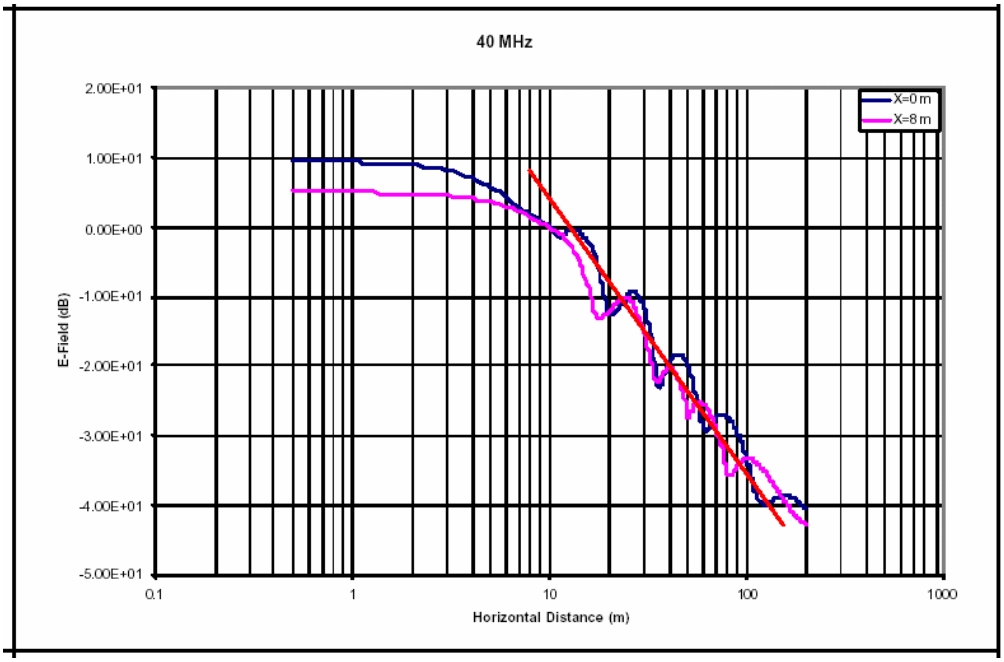


Figure B.5. This graph, reproduced from the comment filed by Ameren Electric Corporation shows the same effect shown in Figure B.4 -- that the field strength under the lines does not change much with horizontal distance. It is impossible to apply any extrapolation from measurements made in this region, so measurements must be made at a greater horizontal separation.

5.2 By making measurements directly under the line, Amperion is underestimating the field strength at 10 meters horizontal separation by about 10 dB.

6. Extrapolation for Slant-Range Distance

6.1 ARRL filings in this proceeding have addressed why it is inappropriate to apply a 40 dB/distance decade extrapolation factor to measurements made in the near-field region of a line-source radiator. (In fact, the case has been made that extrapolation is not a good practice to apply it at all to a large, complex radiating structure). The NTIA Phase I report also concludes that a 40 dB/decade extrapolation factor is not appropriate. In this testing, however, Amperion has applied a 40 dB/decade extrapolation for measurements made at approximately a 10-meter slant-range distance from the power line. This results in an additional underestimation of 10 dB of the field strength at 30 meters distance.

7. “Inaudible”

7.1 ARRL has been puzzled by BPL-industry claims that BPL signals are inaudible a short distance from the source. Testing done by ARRL and NTIA using HF receivers and typical HF antennas has shown that BPL signals are still strong enough to cause interference hundreds of meters from the source. As explained in the following paragraphs, these test data provided by Amperion may explain some of the reasons that BPL proponents mistakenly believe that BPL signals will not be heard at any significant distance from the radiating power lines.

7.2 The test equipment as used by Amperion is just sensitive enough to measure the Part 15-level field strength present immediately near the power line. In many of the graphs, it is not possible to see any change in signal level with and without BPL. This is not because such a change in signal level does not exist. Rather, the test conditions were such that even a strong radiated field strength of approximately +45 dBuV/m as purportedly measured in these tests is sometimes right at the measurement noise floor of the analyzer and antenna used. Under these circumstances, the signal would appear "inaudible." This could lead an inexperienced test engineer to conclude that the signal was below the ambient noise level in the area.

7.3 Even an inexpensive consumer-grade short-wave receiver with a short outdoor antenna is tens of dB more sensitive than the test fixture as used by Amperion. Experience in the BPL test areas shows that amateurs, government users and consumers will hear strong BPL signals for a considerable distance from radiating power lines. Flawed testing using instrumentation and measurement techniques that significantly underestimate the actual field strength and making measurements of signals that are lower than the noise floor of the test system as configured cannot be used as the basis to conclude that BPL signals are inaudible a short distance away from the source.

8. Errors

8.1 The total errors introduced by these flawed test methods are significant. ARRL estimates the errors in the testing done by Amperion as follows[6]:

Testing procedure	Estimated error
Use of incorrect detector	10 dB or more
Making measurements directly under the power line	5 dB
Inappropriate extrapolation for distance	10 dB
Total	25 dB or more

8.2 The errors in the test methods are significant. This system has not been verified to be in compliance with Part 15 emissions limits at distances of 30 meters from the line.

[6] It should be noted that these are conservative estimates.