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December 29, 2010

Via Courier to the Office of the Secretary
and Via E-mail

Kathryn.Berthot@fcc.gov
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Katherine Berthot, Esquire
Chief, Spectrum Enforcement Division
Enforcement Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Mr. Julius Knapp, Chief
Office of Engineering and Technology
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: Interference Complaint: IBEC Access Broadband Over Power Line System at Central Virginia Electric Cooperative, Arrington, VA; BPL Operation in Violation of FCC Regulations, BARC Electric Cooperative, Fairfield, Virginia; Somerset Rural Electric Cooperative, Somerset, PA; and Lake Edgewood Water District Office, Martinsville, IN.

Greetings:

ARRL, the national association for Amateur Radio, formally known as the American Radio Relay League, Incorporated (ARRL), hereby submits, on behalf of its members and other licensed Amateur Radio operators in the vicinity of Lovingston, Virginia; Fairfield, Virginia; Somerset, Pennsylvania and Martinsville, Indiana a complaint of ongoing harmful interference and of numerous, ongoing violations of the Commission's Rules regarding the operation of several IBEC Broadband over Power Line (BPL) systems in those communities. The attached reports concern an ongoing interference complaint involving IBEC, Inc. BPL systems operated in and near Arrington,

Virginia), and the results of measurements and observation of other BPL systems using IBEC's BPL technology. These violations include overpowered BPL operation, BPL database violations, and operation on prohibited Federal government frequencies in violation of Section 15.615(f)(1) of the Commission's rules. Each of the subject BPL systems discussed in this letter and in the attached Exhibits is operated by IBEC.

Based on the two Exhibits attached to this letter[1], ARRL respectfully requests that the Commission initiate immediately an enforcement proceeding regarding these BPL systems, and cause them to cease operation until such time as they are each in full compliance with the Commission's Rules. In the case of the Lovingston, Virginia system, resumption of the operation of this system should be predicated on satisfactory resolution of the harmful interference complaint discussed in ***Exhibit A*** attached.

The report of harmful interference to ongoing Amateur Radio operation is with respect to the IBEC BPL system in the vicinity of Lovingston, Virginia using power lines owned by the Central Virginia Electric Cooperative at Arrington, Virginia. The interference complainant is Mr. Kevin Ward, K4BDR, of Afton, Virginia. This BPL system was measured on two separate occasions by ARRL Laboratory Manager Ed Hare, in March and in December of 2010. Mr. Ward had noted harmful interference to his Amateur station at his home and as well to his mobile Amateur Station during his regular commutes to work. Upon complaining to IBEC with respect to the mobile interference, IBEC told him that there was "nothing that could be done" to correct that interference. Mr. Ward's interference problems at his home Amateur station are a "moving target" because IBEC apparently is resolving interference complaints by notching particular segments of its system at subscriber's sites in the immediate vicinity of the interference complainant, but the problem resurfaces with each new subscriber near the Amateur station.

IBEC had previously represented to ARRL (and separately to a local Amateur group) while negotiating a contract with the Central Virginia Electric Cooperative in this area that it was universally notching Amateur bands, and as well all bands required to be notched by virtue of Section 15.615(f)(1) of the Commission's rules. Indeed, in the BPL Database, IBEC makes the specific representation that "All appropriate Amateur Radio and Public Safety Frequencies are Notched in Compliance with FCC Part 15 Requirements."[2] This statement is false and misleading. As can be seen from the attached Exhibit A, not only is IBEC's BPL system at Lovingston, Virginia not notched in all areas on Amateur bands, neither is it notched on the bands specified in Section 15.615(f)(1). Furthermore, the system is overpowered in bands below 30 MHz, and apparently the power levels are not diminished above 30 MHz. As noted by Mr. Hare at pages 2 and 3 of Exhibit A, this is significant in terms of interference avoidance:

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[1] ***Exhibit A*** attached is the report prepared by ARRL Laboratory Manager Ed Hare of measurements and observations of the IBEC BPL systems at Arrington, Virginia; Fairfield, Virginia; and Somerset, Pennsylvania during the times indicated in the report. ***Exhibit B*** attached is the report prepared by the engineering firm of ARC Technical Resources, which conducted the measurements of the IBEC BPL system at Martinsville, Indiana in March of 2010.

[2] See Page 26 of Exhibit A.

> ARRL has noted that in similar systems operated by other BPL entities, effective notching by systems that are generally operating at the emission limits has proven sufficient to generally protect Amateur fixed, portable and mobile operation, coupled with a case-by-case approach to resolving any remaining harmful interference problems. In all three IBEC systems tested, neither mobile nor fixed operation is reasonably protected from the operation of a system that is operating well outside its limits in several different respects.

The Lovingston, Virginia IBEC BPL system using the Central Virginia Electric Cooperative lines is registered in the BPL database. The same is *not* true with respect to the IBEC BPL systems at Fairfield, Virginia and Somerset, Pennsylvania. Both systems are in commercial deployment but neither appears in the BPL database at all in violation of Section 15.615(a) of the Commission's Rules.

At the Lovingston, Virginia and Fairfield, Virginia locations, as can be seen from Exhibit A attached, the systems were operated well above radiated emission maxima at the sites measured. Though some potential test areas were inaccessible due to private property, the sites measured were sufficient to establish that (1) IBEC is operating these systems well in excess of maximum radiated emission limits;[3] (2) the system did not notch Amateur bands nor the Section 15.615(f)(1) prohibited bands; and (3) the combination of these factors contributed to a very high noise environment between 1.7 and 30 MHz.

Mr. Hare's investigation of the Somerset, PA IBEC BPL site did not involve specific measurements due to an exceptional snowfall in the area during his December 8, 2010 visit to that area. However, his mobile survey using the same communications-grade receiver demonstrated field strength levels similar to those measured at the Lovington and Fairfield, Virginia BPL sites. It was also apparent that the Somerset system (1) was operating well above permitted radiated emission levels; (2) did not notch either the Amateur allocations or the Section 15.615(f)(1) prohibited bands. It was also apparent that the Somerset IBEC system was operating with power levels above 30 MHz that approximated those below 30 MHz.

Exhibit B attached, the report on radiated emissions testing of the IBEC BPL system at Martinsville, Indiana prepared by the engineering firm of ARC Technical Resources reveals essentially the same results as did the Ed Hare studies in Exhibit A. This system does not notch Amateur allocations; it is operated at levels well in excess of permitted radiated emission maxima; and it radiates in the Section 15.615(f)(1) prohibited bands.

Accordingly, based on the ARRL and ARC Technical Resources studies, ARRL requests that the Commission immediately cause each of these BPL systems to cease

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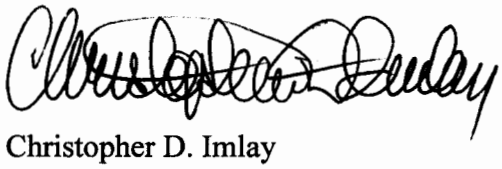
[3] It is unknown how overpowered BPL modems were able to be certified under the Commission's equipment authorization program.

operation system until (1) the Lovingston system is operating in accordance with all applicable BPL rules, and that it is operating without causing harmful interference to licensed Amateur Radio stations; (2) Thirty days after all required information about the Fairfield, VA and Somerset, PA BPL systems is available in the UTC database, as required by §15.615(a); and (3) that all systems are shown to be operating in accordance with all Part 15 regulations, including Section 15.615(f)(1).

In addition, the Commission should determine other appropriate sanctions against IBEC as a result of the multiple rule violations noted herein. ARRL notes that the information contained in these reports amply justifies the modifications of the BPL rules urged by ARRL in ET Docket 04-37, including the mandatory, full-time notching of all Amateur Radio allocations by BPL systems, to a notch depth of at least 30-35 dB.

Kindly address all communications on this subject to the undersigned counsel.

Yours very truly,



Christopher D. Imlay

Attachments
Exhibit A
Exhibit B

Exhibit A

ARRL The national association for AMATEUR RADIO™
ADMINISTRATIVE HEADQUARTERS
225 Main Street, Newington, Connecticut, USA 06111-1494
Telephone: 860-594-0200 ■ FAX: 860-594-0259
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Broadband over Power Lines (BPL)
Simplified Radiated Emissions Testing[1]
(Access Overhead and Underground)
FCC Method (1m measurement height)

EUT INFORMATION	
Type of Device being tested	IBEC BPL system, generation 2
Serial Number	Unknown, multiple
Model Number	IBEC, model unknown
Modulation type	OFDM, DS2 chipset
Lowest external frequency used	1.7 MHz
Highest external frequency used	34 MHz
Power setting during tests	Unknown
Rep rate of data	Not measured

Cumulative Test Results:	**FAIL**
Name & Location of Testing Organization:	**ARRL Laboratory,** Newington, CT
Test Engineer's Signature:	Ed Hare, ARRL Laboratory Manager
Testing date(s):	March 5-8, 2010, December 6-8, 2010
Report date:	December 13, 2010

Locations:

This report describes the results of in-situ testing of IBEC BPL systems at the following locations:

- Central Virginia Electric Cooperative[2] in and near Arrington, VA (CVEC)
- BARC Electric Cooperative[3] in and near Fairfield, VA (BARC)
- Somerset Rural Electric Cooperative[4] in Somerset, PA (SREC)

Executive Summary:

The IBEC Corporation is the manufacturer of all three systems tested. The systems use Orthogonal Frequency-Division Multiplexing (OFDM) technology, using the DS2 200 MB/s chipset.

This testing was initiated in the Lovingston, VA area by ARRL staff in response to a report of harmful interference to Amateur Radio by Kevin Ward, K4BDR, of Afton, VA[5]. Mr. Ward reported partially resolved interference to his home Amateur station, with a continuing need for resolution of new instances of harmful interference as new

[1] As described in IEEE Draft Standard for Broadband Power line Communication Equipment – Electromagnetic Compatibility (EMC) Requirements – Testing and Measurements Methods, Annex A
[2] Central Virginia Electric Cooperative, 800 Cooperative Way, Arrington, VA 22922-3300, Tel (434) 263-8336, Internet: http://www.forcvec.com/about_us/index.html
[3] BARC Electric Cooperative, 84 High St., Millboro, VA 24460-0264, Tel (800) 846-2272, Email: co-op@barcelectric.com, Internet: www.barcelectric.com
[4] Somerset Rural Electric Cooperative, 233 Industrial Park Rd., Somerset, PA 15501, Tel: (814) 445-4106, Internet: http://www.somersetrec.com, Info: http://www.prea.com/Content/somerset.asp

[5] Kevin Ward, K4BDR, 351 Mountain Rd., Afton, VA 22920-5008

neighbors obtained the BPL service. He also reported that within the Amateur bands notched near his station location, the BPL noise level is significantly above the quiet rural noise level previously enjoyed during local use of Amateur spectrum. Mr. Ward also reported that reported interference to his mobile Amateur operation to and from work and during his travels within his community was unresolved, with IBEC, the BPL manufacturer involved, informing him that there is "nothing they can do" to correct interference to his mobile station.

ARRL's testing in March and December 2010 shows that IBEC equipment as deployed is capable of and actually does significantly exceed the radiated emission limits for BPL. It also shows that Amateur band notching and the protection of spectrum required by §15.615(f)(1) is not generally implemented.

During the time it was negotiating a contract with CVEC, IBEC had previously demonstrated to ARRL staff and separately to local amateurs that it was ***universally*** notching the Amateur allocations and the bands in which BPL is prohibited pursuant to §15.615(f)(1) of the FCC's rules. Once IBEC secured that contract, based in part on findings of the local Amateur community, IBEC ***ceased*** notching the Amateur bands and the spectrum described in §15.615(f)(1) . This demonstration of Amateur band notching was documented in two Exhibits[6] ,[7] provided by ARRL as part of its November 30, 2010 Ex Parte filing in the ET Docket 04-37 rulemaking proceeding dealing with BPL rules.

In its measurements of the CVEC system made during 3 days in March 2010 (and confirmed in further testing in December, 2010 of the CVEC, BARC and SREC systems in Virginia and Pennsylvania), ARRL found that the operating frequency of these systems was ***not*** in accordance with the frequency-use information that IBEC has entered into the BPL industry database. In December 2010, IBEC made changes to the contact information in the BPL database, so the substantial and continued misrepresentation of frequency use is not a simple oversight.

Notching of the Amateur bands and notching of federal spectrum as required by §15.615(f)(1) of the FCC's rules is not implemented in most areas of the three systems tested.

The March 2010 testing included measurements below and above 30 MHz. In the December 2010 testing, measurements were not made above 30 MHz, but it was observed that there was no reduction in noise level when tuning below and then significantly above 30 MHz. The system is operating at the same level above 30 MHz as it is operating below 30 MHz in all cases spot checked during testing. Especially in cases where the emissions below 30 MHz exceeded the emissions limits, this is a certain indication that the emissions above 30 MHz are significantly exceeding the limits. This is what *was* measured in the March 2010 measurements made by ARRL staff.

Although it was somewhat difficult to obtain access to parts of these rural systems due to the general rural practice of running power lines directly between houses or groups of houses and through posted private land, ARRL consistently found that in location after location for which access could be obtained, the systems are operating above the permitted maximum radiated emission limits.

ARRL was not able to make measurements of the IBEC system in Somerset, PA due to an ongoing lake-effect snowstorm and hazardous parking conditions. However, the levels shown on the signal-strength indicator on the communications receiver employed were consistent with the high levels seen on the same communications receiver and measured, at the sites of the other systems.

Testing was also done by staff from ARC Technical Resources of the smaller system in Martinsville, IN. ARC Technical Resources had findings similar to those of ARRL: an absence of notching in the Amateur bands; an absence of notching in the spectrum protected from BPL by §15.615(f)(1); and emissions exceeding the FCC limits. The results of this testing are provided separately.

ARRL has noted that in similar systems operated by other BPL entities, effective notching by systems that are generally operating at the emission limits has proven sufficient to generally protect Amateur fixed, portable and mobile operation, coupled with a case-by-case approach to resolving any remaining harmful interference

[6] "Albermarle Amateur Radio Club report on notching before system-wide notching was removed by IBEC subsequent to this testing." See http://fjallfoss.fcc.gov/ecfs/document/view?id=7020921740

[7] "Field Test Report: Broadband over Power Line (BPL) Communications Interference Test for International Broadband Electric Communications, Inc. (IBEC), January 7, 2004." See http://fjallfoss.fcc.gov/ecfs/document/view?id=7020921739.

problems. In all three IBEC systems tested, neither mobile nor fixed operation is reasonably protected from the operation of a system that is operating well outside its limits in several different respects.

The system in Arrington, VA and environs[8] is registered in the FCC-mandated BPL database at http://www.bpldatabase.org. The systems in Fairfield, VA[9] and Somerset, PA[10] are both in commercial deployment, but have no entries in the BPL database.

Applicable Standards:	
ANSI C63.4 (2003)	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
47CFR15 subpart G (2004)	Specified in FCC Report & Order 04-245 "Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems" released October 28, 2004
IEEE-P1775 / D5 (2010)	Draft Standard for Broadband Power line Communication Equipment – Electromagnetic Compatibility (EMC) Requirements – Testing and Measurements Methods (June, 2010)

TEST EQUIPMENT				
Manufacturer	**Description**	**Model Number**	**Serial Number**	**Calibration**
Rohde & Schwarz	EMC Spectrum Analyzer	FSH3 opt. K1, K3, Z21, Z25	102393	(yearly)
ETS-Lindgren	Active loop antenna (internal preamplifier)	6502	00051644	(biannual)
ETS-Lindgren	Biconical antenna	3104C	N/A	(as needed)
Not specified	Non-metallic tripod	N/A	N/A	N/A
Ben Meadows	Optical range-finder	--	--	N/A
Lufkin	Non-conductive tape measure	100'	N/A	N/A
ICOM America	Communications transceiver	IC-756Pro II	03651	N/A
Yaesu	Communications transceiver	FT-817	4HB70017	N/A
Kenwood	Communications transceiver	TS-480SAT	7070030	N/A
MFJ	Adjustable 8' mobile whip antenna	MFJ-1662	N/A	N/A
Iron Horse	Monoband mobile whip antennas	N/A	N/A	N/A

RG-223/U CABLE LOSS vs. FREQUENCY				
Loss /100 ft. (dB)	0.4 dB	1.2 dB	3.2 dB	4.8 dB
Frequency (MHz)	2MHz	10MHz	50MHz	100MHz
Loss of actual cable used:	0.1	0.1	0.3	0.3

[8] See http://www.facebook.com/notes/central-virginia-electric-cooperative/a-quick-update-on-the-broadband-over-powerline-project-bpl/404695293898.
[9] See http://www.barcelectric.com/index.php?option=com_content&view=article&id=73&Itemid=88.
[10] See http://www.somersetrec.com/wpi/?p=156.

EMISSIONS LIMITS (United States)		
Test	**Frequency Range**	**Field Strength Limit**
Radiated Emissions	1.705 MHz – 30 MHz	**29.5 dBμV/m** @ 30 meters*
	30 MHz - 80 MHz	**39.1 dBμV/m** @ 10 meters*
***** Installations are measured at slant-range distances other than those listed. The dB value to subtract from the measured values in the United States are calculated using these formulas: $40\log_{10}$ 30m/d_n for frequencies below 30MHz $20\log_{10}$ 10m/d_n for frequencies above 30MHz		

BPL Testing Methodology below 30MHz:

Initial frequency survey: Spectrum analyzer

Set spectrum analyzer to PEAK detection, 10 kHz IF bandwidth, 15 MHz center frequency, 100 kHz/div. Evaluate the band from 1.705 to 30MHz looking for BPL signals, demodulate and analyze signature to verify candidates. (Center frequencies of 2, 3, 4, 5, 6, etc. selected every 1MHz from 2 to 30MHz)

Initial frequency survey: Communications receiver

As an alternative to the use of a spectrum analyzer, or to aid in demodulation of received signals, a communications receiver may be used. Tune across the band of interest, determining by ear the presence of signals with known BPL characteristics or the known characteristics of licensed radio signals.

Measurement procedure:

Utilize the simplified test procedure for BPL systems outlined in the draft IEEE P1775 BPL EMC standard. It is based on the test procedure specified in Measurement Guidelines for Access Broadband over Power Line (BPL) Systems.[11] To the extent practical, measurements should be made at a horizontal distance of 10 meters from the equipment under test (EUT) or the exterior of a premise with wiring carrying BPL signals, or a BPL coupler connected to overhead power lines or a step-down transformer.

Below 30 MHz, the results shall be extrapolated to the limit distance of 30 meters using a 40 dB/decade extrapolation factor, based on the slant-range distance to the EUT wiring. Measurements shall be made with a magnetic loop antenna, applying antenna factors expressed in terms of electric field strength in dB/m. The antenna shall be oriented with the loop vertical, at a height of 1 meter. The loop shall be rotated through 180 degrees and the maximum value obtained at each distance and frequency shall be reported.

BPL Testing Methodology above 30MHz:

Initial frequency survey: Spectrum analyzer

Set spectrum analyzer to PEAK detection, 100 kHz IF bandwidth, 55 MHz center frequency, 100 kHz/div. Evaluate the band from 30 to 80 MHz, looking for BPL signals, demodulate and analyze signature to verify candidates.

Initial frequency survey: Communications receiver

As an alternative to the use of a spectrum analyzer, or to aid in demodulation of received signals, a communications receiver may be used. Tune across the band of interest, determining by ear the presence of signals with known BPL characteristics or the known characteristics of licensed radio signals.

Measurement procedure:

[11] This is available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-245A1.pdf.

Utilize the simplified test procedure for BPL systems outlined in the draft IEEE P1775 BPL EMC standard. It is based on the test procedure specified in Measurement Guidelines for Access Broadband over Power Line (BPL) Systems. To the extent practical, measurements should be made at a horizontal distance of 10 meters from the equipment under test (EUT) or the exterior of a premise with wiring carrying BPL signals, or a BPL coupler connected to overhead power lines or a step-down transformer.

Above 30 MHz, the results shall be extrapolated to the limit distance of 10 meters using a 20 dB/decade extrapolation factor, based on the slant-range distance to the EUT wiring. Measurements shall be made with a bi-conical antenna. Measurements shall be made at each location and frequency with the antenna oriented horizontally, broadside to the EUT and vertically. The maximum value obtained at each distance and frequency shall be reported.

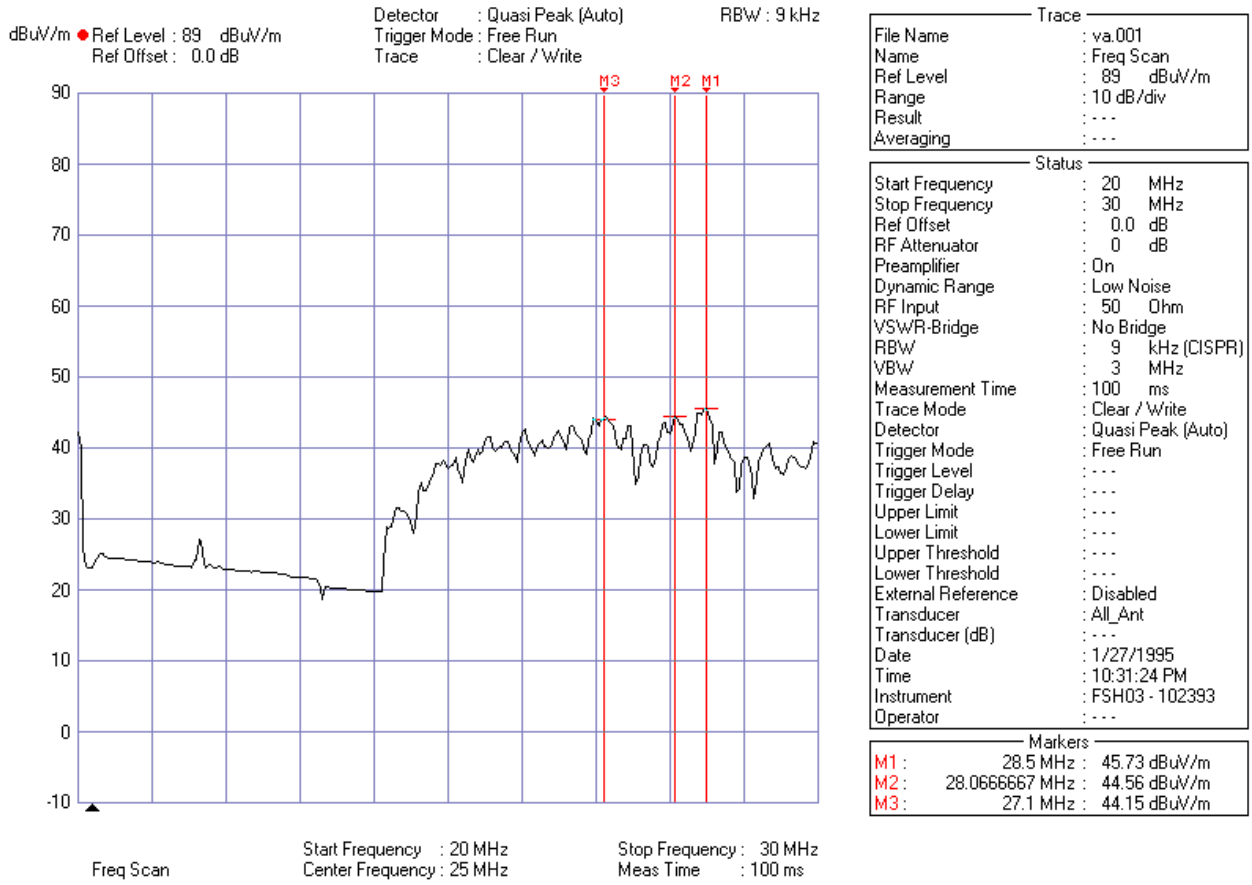
Measurement Results:

Location #1 – Stephen's Cove Road, Lovingston, VA

Photo/map of test site

Measurement results: 1.705 to 30 MHz

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Stephen's Cove Road, Lovingston, VA, no houses, BPL repeater visually observed on pole supporting power lines in the woods.
Date: December 6, 2010
Horizontal distance to EUT, premise or overhead line: 11.3 meters (approximate)
Height of overhead line (if applicable): 15.7 meters
Slant range distance: 18.5 meters
Slant range distance correction (40 log): -8.4 dB

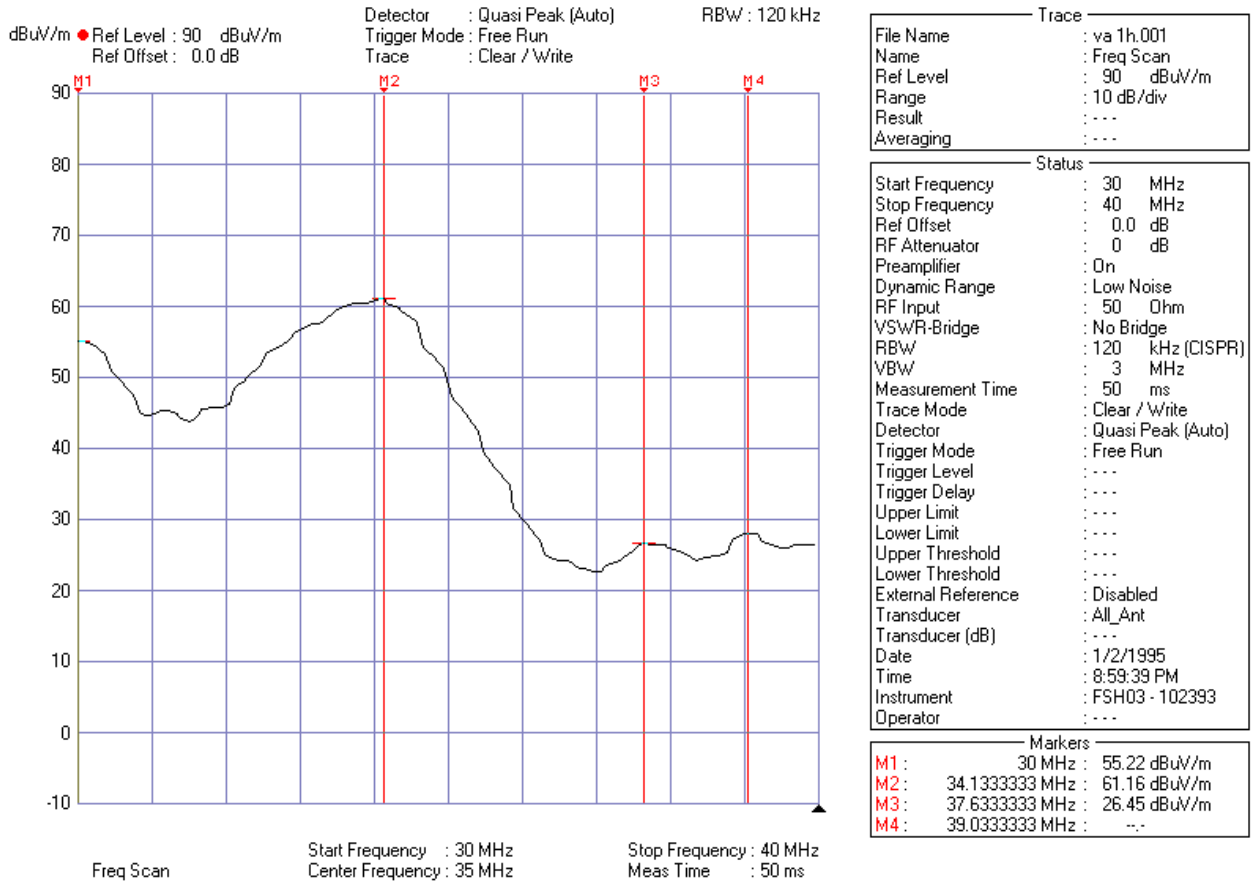


Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 3 highest readings (MHz)	28.4	28.1	27.1	--	--	--
Quasi peak spectrum analyzer voltages (dBμV)	45.7	44.5	44.5	--	--	--
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	--	--	--
Antenna Factor@measurement frequency (dB/m) [12]	n/a	n/a	n/a	--	--	--
Slant range distance correction (40log 30/X) (dB)	-8.4	-8.4	-8.4	--	--	--
Corrected E-Field Strength (dBμV/m @ 30m)	37.4	36.2	36.2	--	--	--
Test margin (dB)	+7.9	+6.7	+6.7	--	--	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	--	--	--
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	--	--	--

Measurement results: 30 to 1000 MHz:

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Stephen's Cove Road, Lovingston, VA, no houses, BPL repeater visually observed on pole supporting power lines in the woods.
Date: March 5, 2010 through March 8, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters
Height of overhead line (if applicable): 15.7 meters
Slant range distance: 17.8 meters
Slant range distance correction (20 log): +5.0 dB

[12] For all tables in this report, the spectrum analyzer used has all antenna factors pre-programmed into memory, so all reported results in dBμV include the antenna factor.



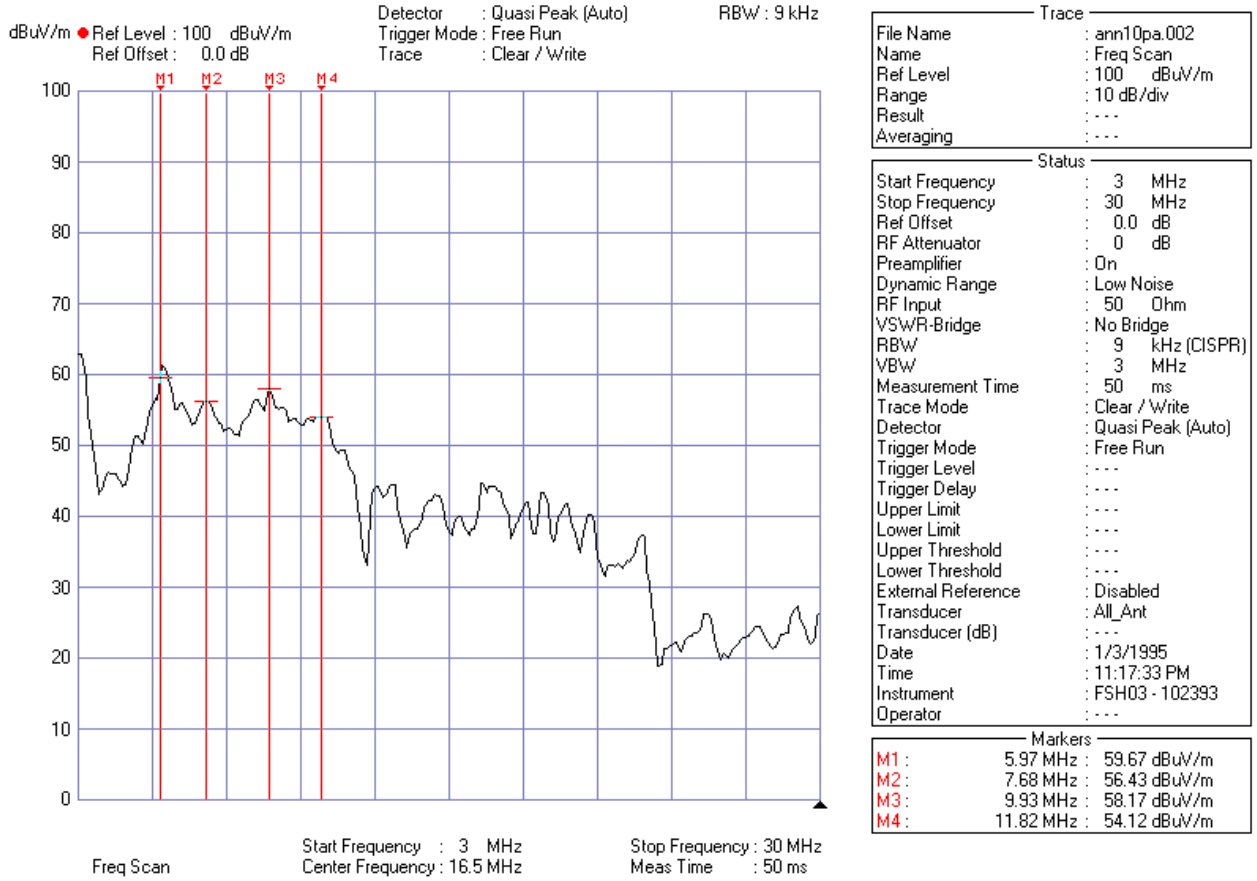
Field Strength 30 MHz to 1000 MHz (from spectral plot)						
Frequencies of 4 highest readings (MHz)	30.0	34.1	37.6	39.0	--	--
Quasi peak spectrum analyzer voltages (dBμV) (Indicate Horizontal or Vertical polarization)	55.2 H	61.2 H	26.4 H	27.8 H	--	--
Cable loss at the measurement frequency (dB)	0.3	0.3	0.3	0.3	--	--
Antenna Factor @ measurement frequency (dB/m)					--	--
Height conversion E-Field (+5 dB overhead only)	+5.0	+5.0	+5.0	+5.0	--	--
Slant range distance correction (20log 10/X) (dB)	+5.0	+5.0	+5.0	+5.0	--	--
Corrected Worst Case Field (dBμV/m @ 10m)	65.5	71.5	36.7	38.1	--	--
Test margin (dB)	+26.5	+32.4	-2.4	-1.0	--	--
FCC Limit Field Strength (dBμV/m @ 10 meters)	39.1	39.1	39.1	39.1	--	--
Test Results: FAIL	**FAIL**	**FAIL**	PASS	PASS	--	--

Location #2 – 1170 Thomas Nelson Highway, Arrington, VA (parking lot)

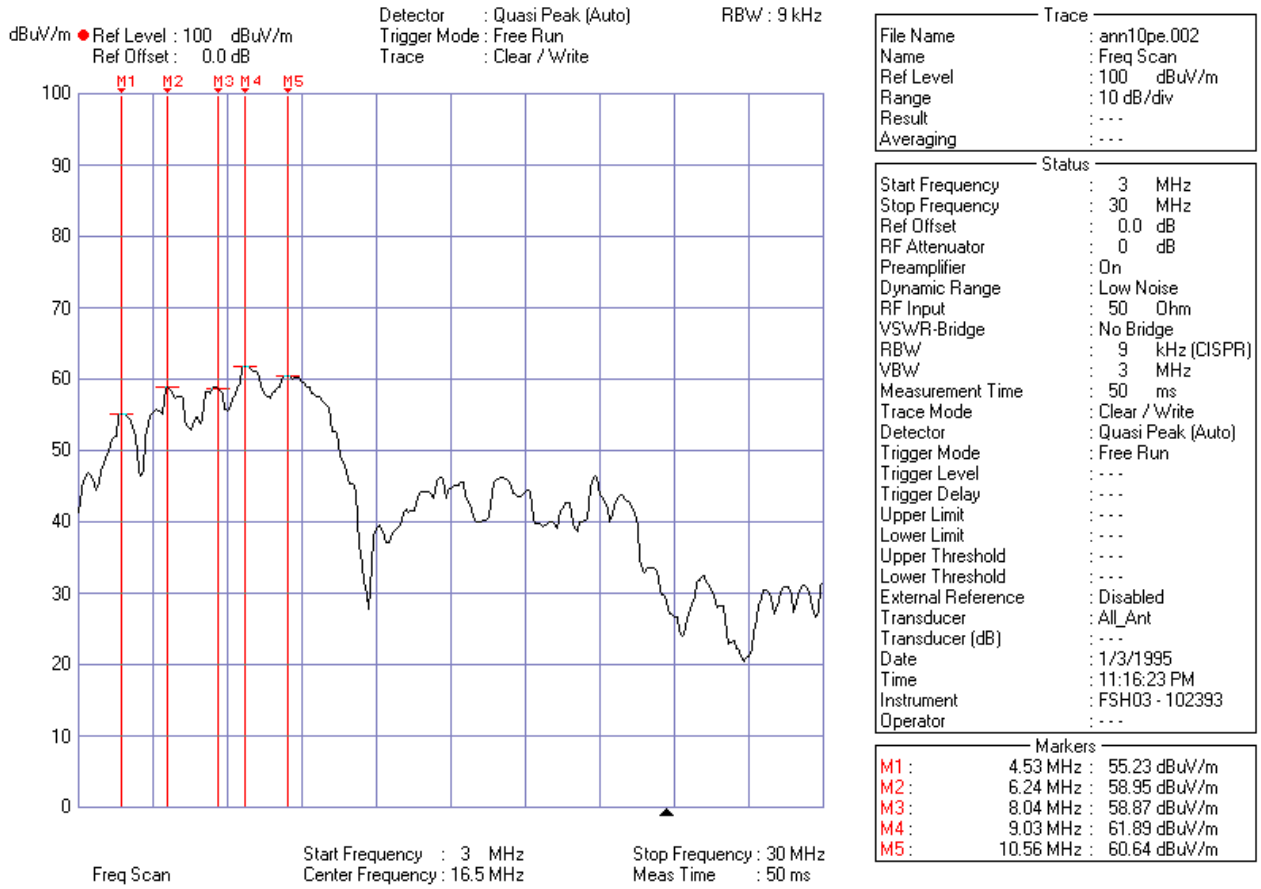
Photo/map of test site

Measurement results: 1.705 to 30 MHz

Test description: Measurement of overhead MV line carrying BPL signal
Test location: 1170 Thomas Nelson Highway, Arrington, VA (parking lot)
Date: March 5, 2010 through March 8, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters
Height over overhead line (if applicable): 12 meters (approximate)
Slant range distance: 14.9 meters
Slant range distance correction (40 log): -12.2 dB



Field Strength 1.705 MHz to 30 MHz (from spectral plot) 10 meters horizontal distance, loop parallel to overhead power lines						
Frequencies of 5 highest readings (MHz)	3.0	6.0	7.7	9.9	11.9	--
Quasi peak spectrum analyzer voltages (dBμV)	63.0	58.7	56.4	58.2	54.1	--
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	--
Slant range distance correction (40log 30/X) (dB)	-12.2	-12.2	-12.2	-12.2	-12.2	--
Corrected E-Field Strength (dBμV/m @ 30m)	50.9	46.6	44.3	46.1	42.0	--
Test margin (dB)	+21.4	+17.1	+14.8	+16.6	+12.5	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	--
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	--



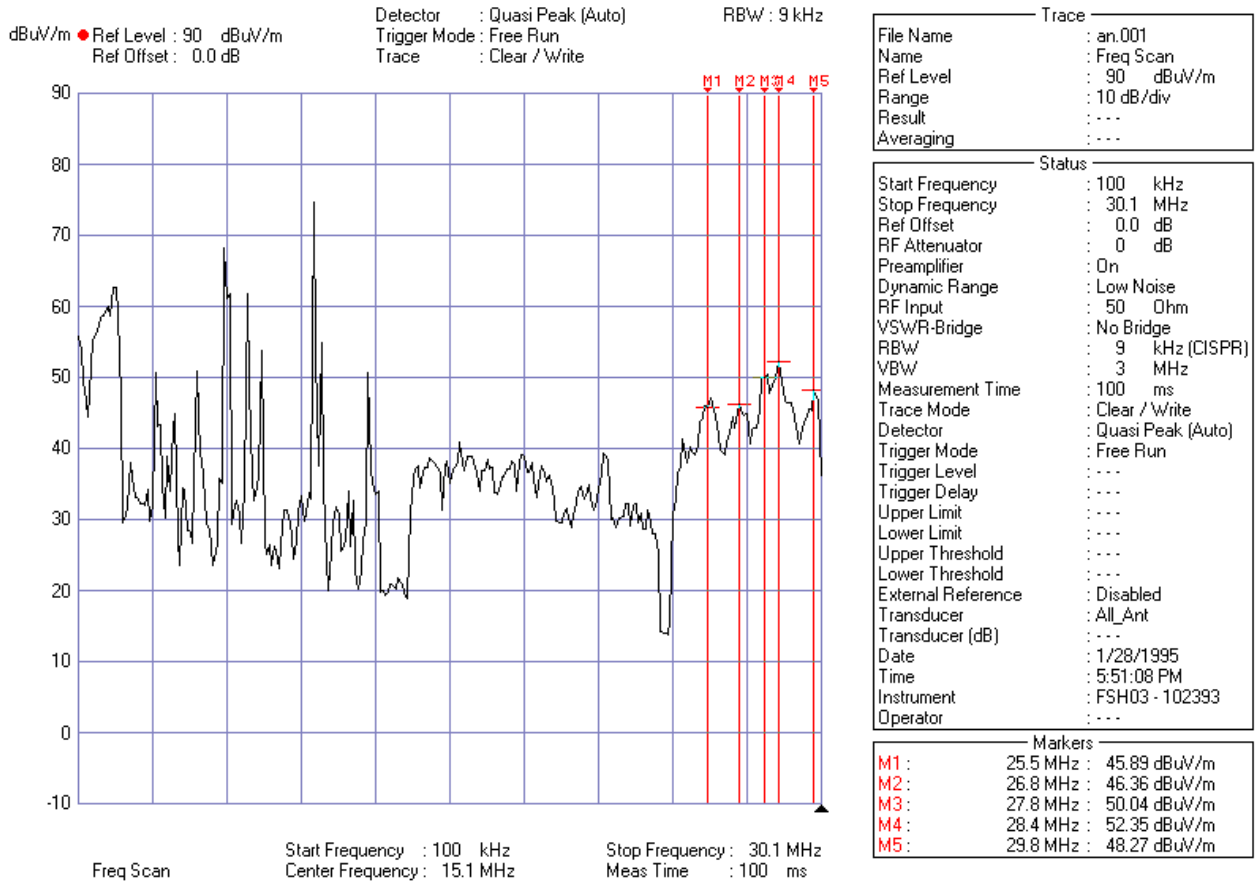
Field Strength 1.705 MHz to 30 MHz (from spectral plot) 10 meters horizontal distance, loop perpendicular to overhead power lines:						
Frequencies of 4 highest readings (MHz)	4.5	6.2	8.0	9.0	10.6	--
Quasi peak spectrum analyzer voltages (dBμV)	55.2	59.0	58.9	61.9	60.6	--
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	--
Slant range distance correction (40log 30/X) (dB)	-12.2	-12.2	-12.2	-12.2	-12.2	--
Corrected E-Field Strength (dBμV/m @ 30m)	43.1	46.9	46.8	49.8	48.5	--
Test margin (dB)	+13.6	+17.4	+17.3	+20.3	+19.0	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	--
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	--

Re-measurement results – December 6, 2010

Measurement results: 1.705 to 30 MHz

Note: This location was re-measured on December 6, 2010. The levels at this location had decreased from prior measurements, but were still above the limits.

Test description: Measurement of overhead MV line carrying BPL signal
Test location: 1170 Thomas Nelson Highway, Arrington, VA (parking lot)
Date: December 6, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters
Height over overhead line (if applicable): 12 meters (approximate)
Slant range distance: 14.9 meters
Slant range distance correction (40 log): -12.2 dB



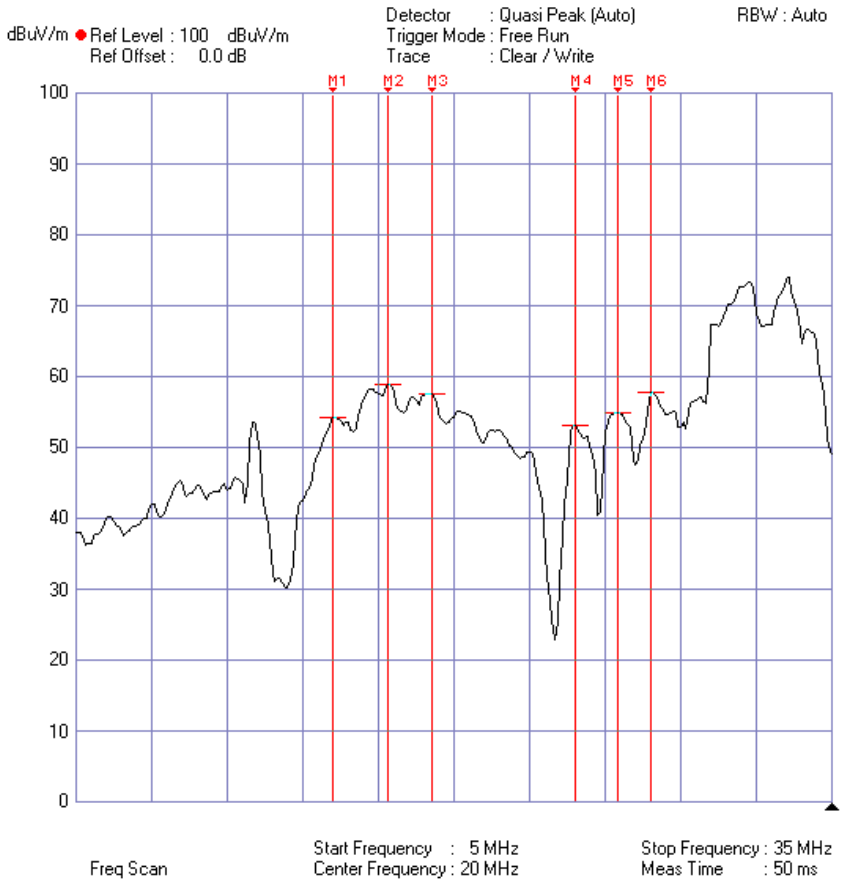
Field Strength 1.705 MHz to 30 MHz (from spectral plot) 10 meters horizontal distance, loop perpendicular to overhead power lines:						
Frequencies of 4 highest readings (MHz)	25.5	26.8	27.8	28.4	29.8	--
Quasi peak spectrum analyzer voltages (dBµV)	45.9	46.3	50.0	52.3	48.3	--
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	--
Slant range distance correction (40log 30/X) (dB)	-12.2	-12.2	-12.2	-12.2	-12.2	--
Corrected E-Field Strength (dBµV/m @ 30m)	33.8	34.2	37.9	40.2	36.2	--
Test margin (dB)	+4.3	+4.7	+8.4	+10.7	+6.7	--
FCC Limit Field Strength (dBµV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	--
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	--
					--	--

Test location #3 – Cooperative Way, VA – near CVEC administrative offices

Photo/map of test site

Measurement results: 1.705 to 30 MHz:

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Cooperative Way, Arrington, VA – near CVEC administrative offices
Date: March 5, 2010 through March 8, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters
Height of overhead line (if applicable): 12 meters (approximate)
Slant range distance: 14.9 meters
Slant range distance correction (40 log): -12.2 dB



Trace	
File Name	: colpa.001
Name	: Freq Scan
Ref Level	: 100 dBuV/m
Range	: 10 dB/div
Result	: - - -
Averaging	: - - -

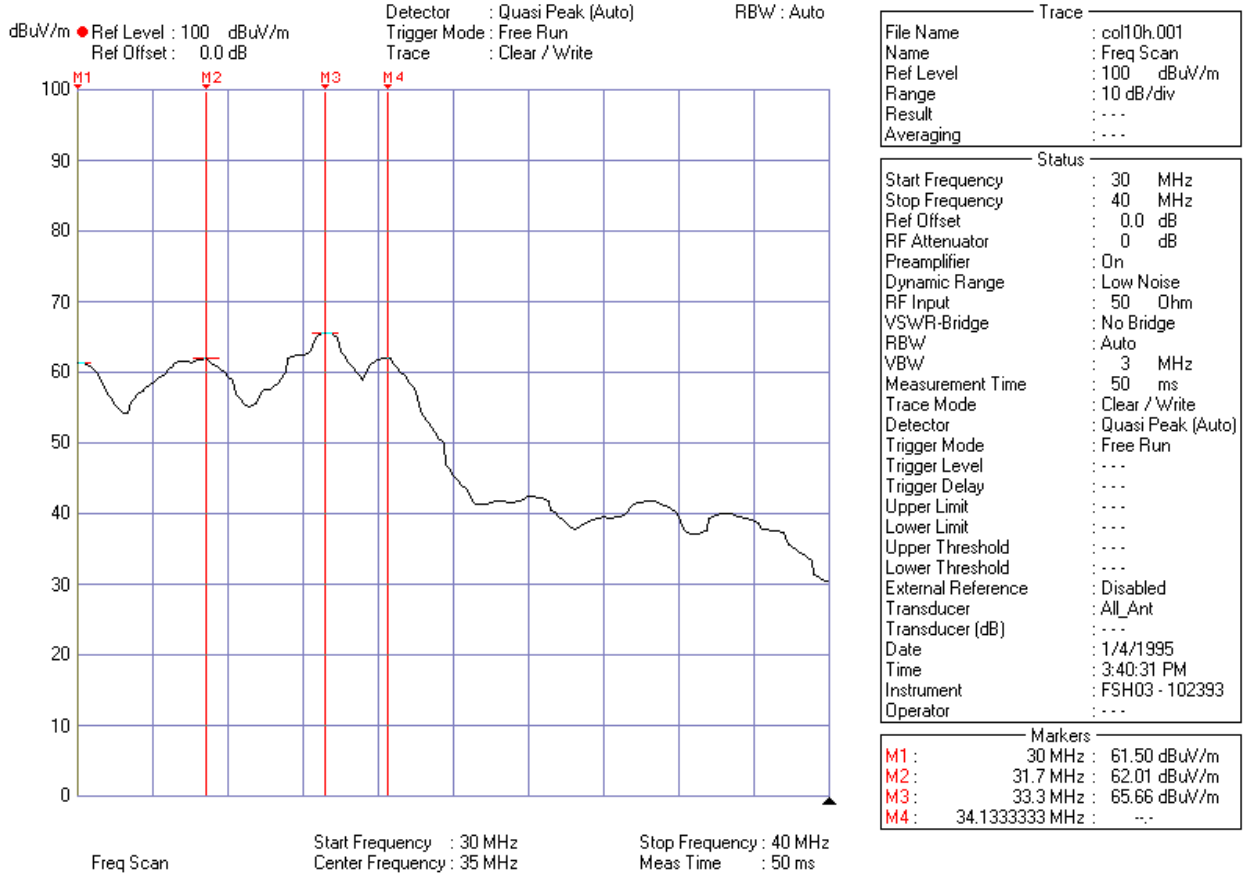
Status	
Start Frequency	: 5 MHz
Stop Frequency	: 35 MHz
Ref Offset	: 0.0 dB
RF Attenuator	: 0 dB
Preamplifier	: On
Dynamic Range	: Low Noise
RF Input	: 50 Ohm
VSWR-Bridge	: No Bridge
RBW	: Auto
VBW	: 3 MHz
Measurement Time	: 50 ms
Trace Mode	: Clear / Write
Detector	: Quasi Peak (Auto)
Trigger Mode	: Free Run
Trigger Level	: - - -
Trigger Delay	: - - -
Upper Limit	: - - -
Lower Limit	: - - -
Upper Threshold	: - - -
Lower Threshold	: - - -
External Reference	: Disabled
Transducer	: All_Ant
Transducer (dB)	: - - -
Date	: 1/4/1995
Time	: 3:21:27 PM
Instrument	: FSH03 - 102393
Operator	: - - -

Markers		
M1 :	15.2 MHz :	54.40 dBuV/m
M2 :	17.4 MHz :	58.91 dBuV/m
M3 :	19.1 MHz :	57.74 dBuV/m
M4 :	24.8 MHz :	53.16 dBuV/m
M5 :	26.5 MHz :	54.90 dBuV/m
M6 :	27.8 MHz :	57.90 dBuV/m

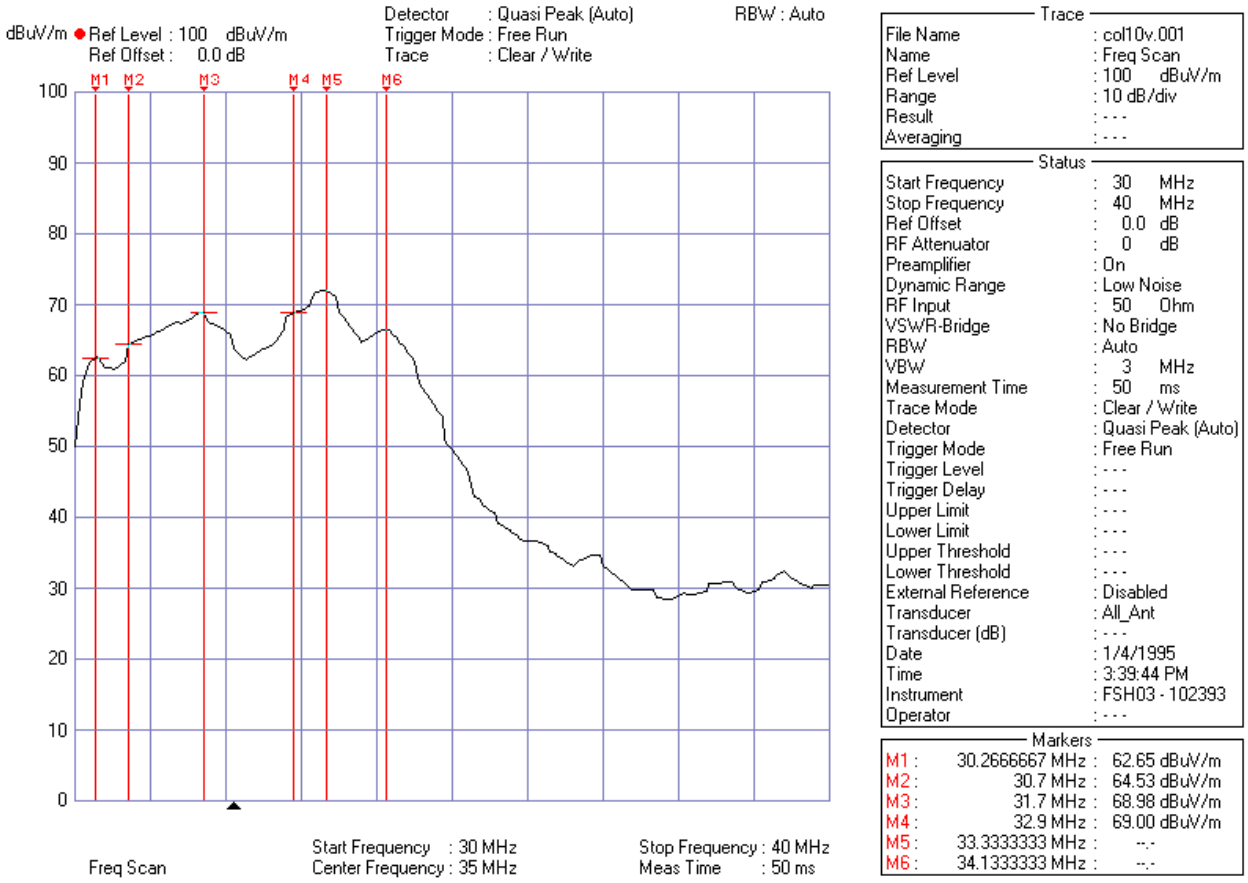
Field Strength 1.705 MHz to 30 MHz (from spectral plot) Horizontal distance: 10 meters, loop oriented for maximum						
Frequencies of 6 highest readings (MHz)	15.2	17.4	19.1	24.8	26.5	27.8
Quasi peak spectrum analyzer voltages (dBμV)	54.4	58.9	57.8	53.2	54.9	57.9
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	0.1
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	n/a
Slant range distance correction (40log 30/X) (dB)	-12.2	-12.2	-12.2	-12.2	-12.2	-12.2
Corrected E-Field Strength (dBμV/m @ 30m)	42.3	46.8	45.7	41.1	43.8	45.8
Test margin (dB)	+12.8	+17.3	+16.2	+11.6	+13.3	+16.3
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**

Measurement results: 30 to 1000 MHz:

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Cooperative Way, Arrington, VA – near CVEC administrative offices
Date: March 5, 2010 through March 8, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters
Height of overhead line (if applicable): 12 meters (approximate)
Slant range distance: 14.9 meters
Slant range distance correction (20 log): +3.5 dB



Field Strength 30 MHz to 1000 MHz (from spectral plot) Horizontal distance: 10 meters, bi-conical antenna horizontally polarized						
Frequencies of 4 highest readings (MHz)	30	31.7	33.3	34.1	--	--
Quasi peak spectrum analyzer voltages (dBμV)	61.5	62	65.7	62.1	--	--
Cable loss at the measurement frequency (dB)	0.3	0.3	0.3	0.3	--	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	--	--
Height conversion E-Field (+5 dB overhead only)	+5.0	+5.0	+5.0	+5.0	--	--
Slant range distance correction (20log 10/X) (dB)	+3.5	+3.5	+3.5	+3.5	--	--
Corrected Worst Case Field (dBμV/m @ 10m)	70.3	70.8	74.5	70.9	--	--
Test margin (dB)	+31.2	+31.7	+35.4	+31.8	--	--
FCC Limit Field Strength (dBμV/m @ 10 meters)	39.1	39.1	39.1	39.1	--	--
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	--	--



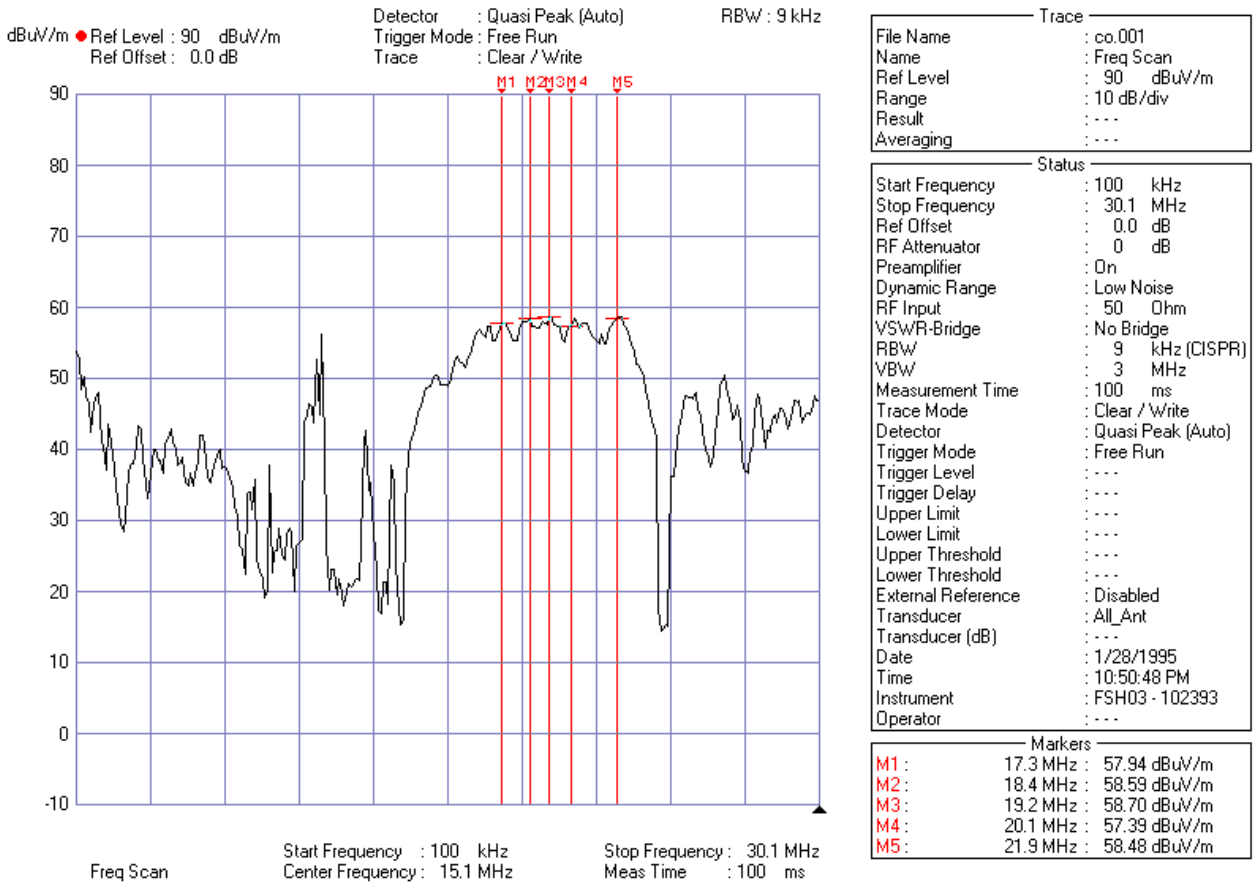
Field Strength 30 MHz to 1000 MHz (from spectral plot) Horizontal distance: 10 meters, bi-conical antenna vertically polarized						
Frequencies of 6 highest readings (MHz)	30.3	30.7	31.7	32.9	33.3	34.1
Quasi peak spectrum analyzer voltages (dBμV)	62.7	64.5	69.0	69.0	72	66.7
Cable loss at the measurement frequency (dB)	0.3	0.3	0.3	0.3	0.3	0.3
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	n/a
Height conversion E-Field (+5 dB overhead only)	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0
Slant range distance correction (20log 10/X) (dB)	+3.5	+3.5	+3.5	+3.5	+3.5	+3.5
Corrected Worst Case Field (dBμV/m @ 10m)	71.5	73.3	77.8	77.8	80.8	75.5
Test margin (dB)	+32.4	+34.2	+38.7	+38.7	+41.7	+36.4
FCC Limit Field Strength (dBμV/m @ 10 meters)	39.1	39.1	39.1	39.1	39.1	39.1
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**

Re-measurement results – December 6, 2010

Measurement results: 1.705 to 30 MHz

Note: This location was re-measured on December 6, 2010. Below 30 MHz, the levels at this location were approximately the same as they had been in the March 2010 testing. Measurements were not made above 30 MHz in the December 2010 testing.

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Cooperative Way, Arrington, VA – near CVEC administrative offices
Date: December 6, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters
Height of overhead line (if applicable): 12 meters (approximate)
Slant range distance: 14.9 meters
Slant range distance correction (40 log): -12.2 dB



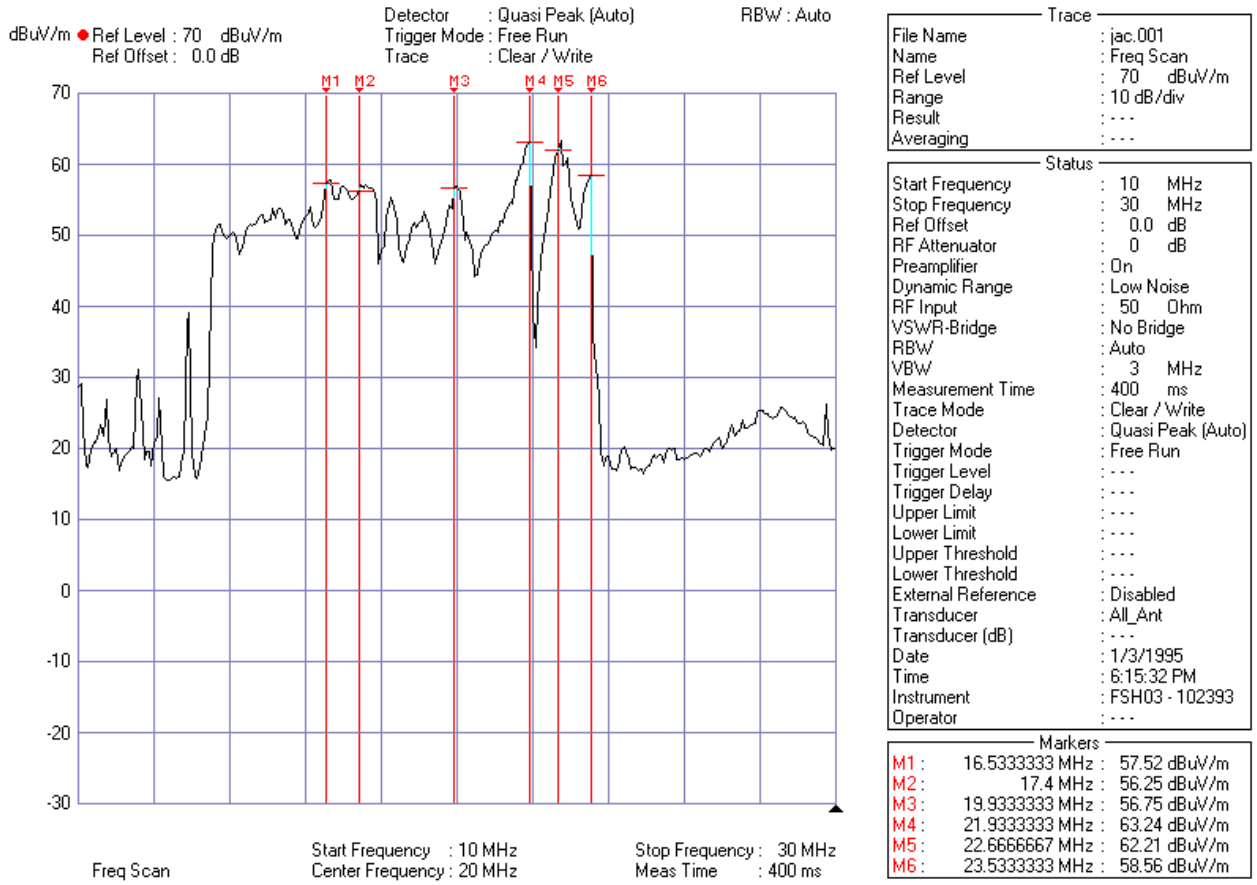
Field Strength 1.705 MHz to 30 MHz (from spectral plot) Horizontal distance: 10 meters, loop oriented for maximum						
Frequencies of 6 highest readings (MHz)	17.3	18.4	19.2	20.1	21.9	--
Quasi peak spectrum analyzer voltages (dBμV)	58.0	58.6	58.7	57.4	58.5	--
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	--
Slant range distance correction (40log 30/X) (dB)	-12.2	-12.2	-12.2	-12.2	-12.2	--
Corrected E-Field Strength (dBμV/m @ 30m)	45.9	46.5	46.6	45.3	46.4	--
Test margin (dB)	+16.4	+17.0	+17.1	+15.8	+16.9	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	--
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	--

Test location #4 – private residence

Photo/map of test site

Measurement results: 1.705 to 30 MHz

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Private residence
Date: March 5, 2010 through March 8, 2010
Horizontal distance to EUT, premise or overhead line: 8 meters (approximate)
Height of overhead line (if applicable): 10 meters (approximate)
Measurement height: 2 meters
Slant range distance: 11.3 meters
Slant range distance correction (40 log): -16.9 dB



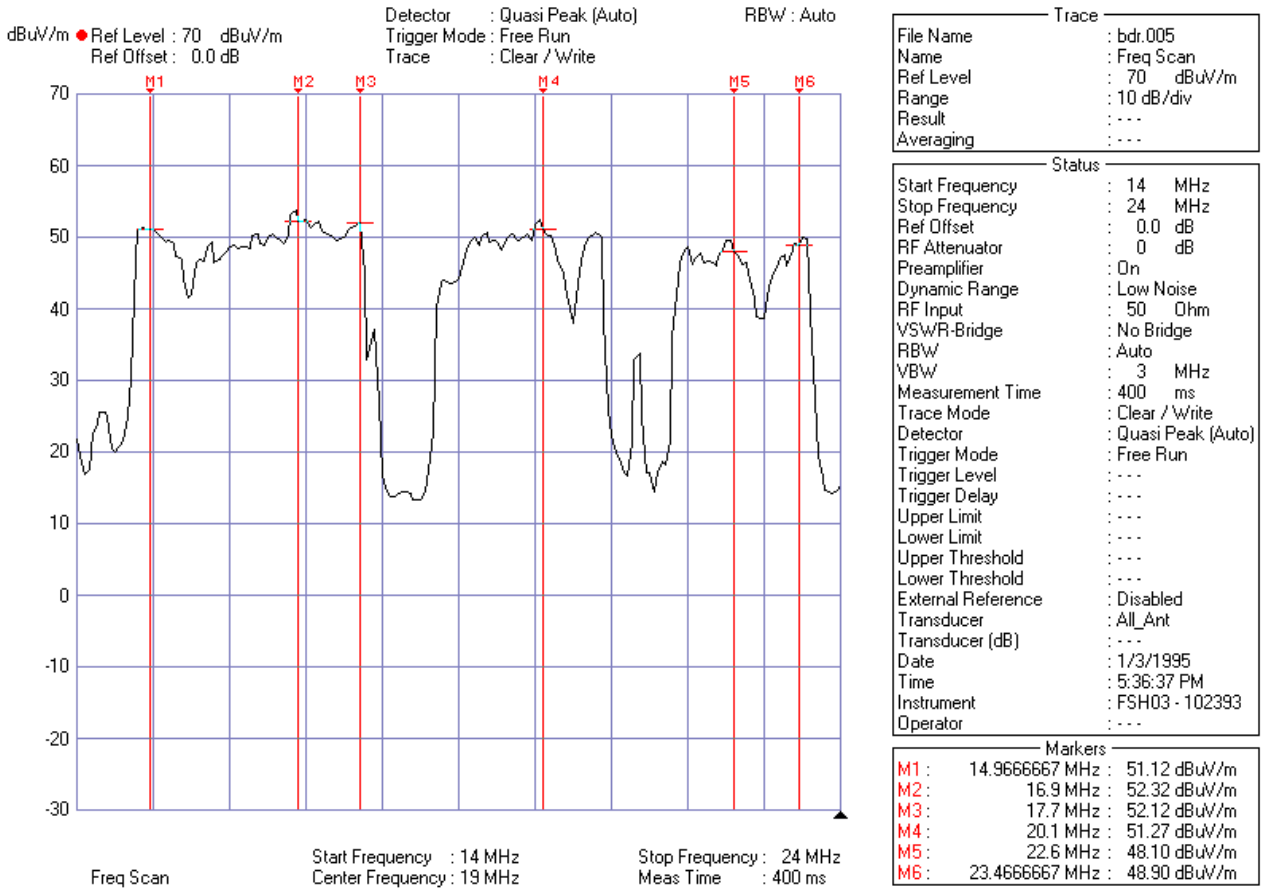
Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 6 highest readings (MHz)	16.5	17.4	19.9	21.9	22.7	23.5
Quasi peak spectrum analyzer voltages (dBμV)	57.5	56.2	56.8	63.2	62.2	58.6
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	0.1
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	n/a
Slant range distance correction (40log 30/X) (dB)	-16.9	-16.9	-16.9	-16.9	-16.9	-16.9
Corrected E-Field Strength (dBμV/m @ 30m)	40.7	39.4	40.0	46.4	45.4	41.8
Test margin (dB)	+11.2	+9.9	+10.5	+16.9	+15.9	+12.3
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**

Test location #5 – K4BDR, Afton, VA

Photo/map of test site

Measurement results: 1.705 to 30 MHz:

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Kevin Ward, K4BDR, 351 Mountain Rd, Afton, VA
Date: March 5, 2010 through March 8, 2010
Horizontal distance to EUT, premise or overhead line: 50 meters (approximate)[13]
Height of overhead line (if applicable): 10 meters (see footnote)
Slant range distance: 50.8 meters (see footnote)
Slant range distance correction (20 log): + 4.6 dB



Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 6 highest readings (MHz)	15.0	16.9	17.7	20.1	22.6	23.5
Quasi peak spectrum analyzer voltages (dBμV)	51.1	52.3	52.1	51.3	48.1	48.9
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	0.1
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	n/a
Slant range distance correction (20log 30/X) (dB)[14]	+4.6	+4.6	+4.6	+4.6	+4.6	+4.6
Corrected E-Field Strength (dBμV/m @ 30m)	55.8	57.0	56.8	56.0	52.8	53.6
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test margin (dB)	+26.3	+22.8	+27.3	+26.5	+23.3	+24.1
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**

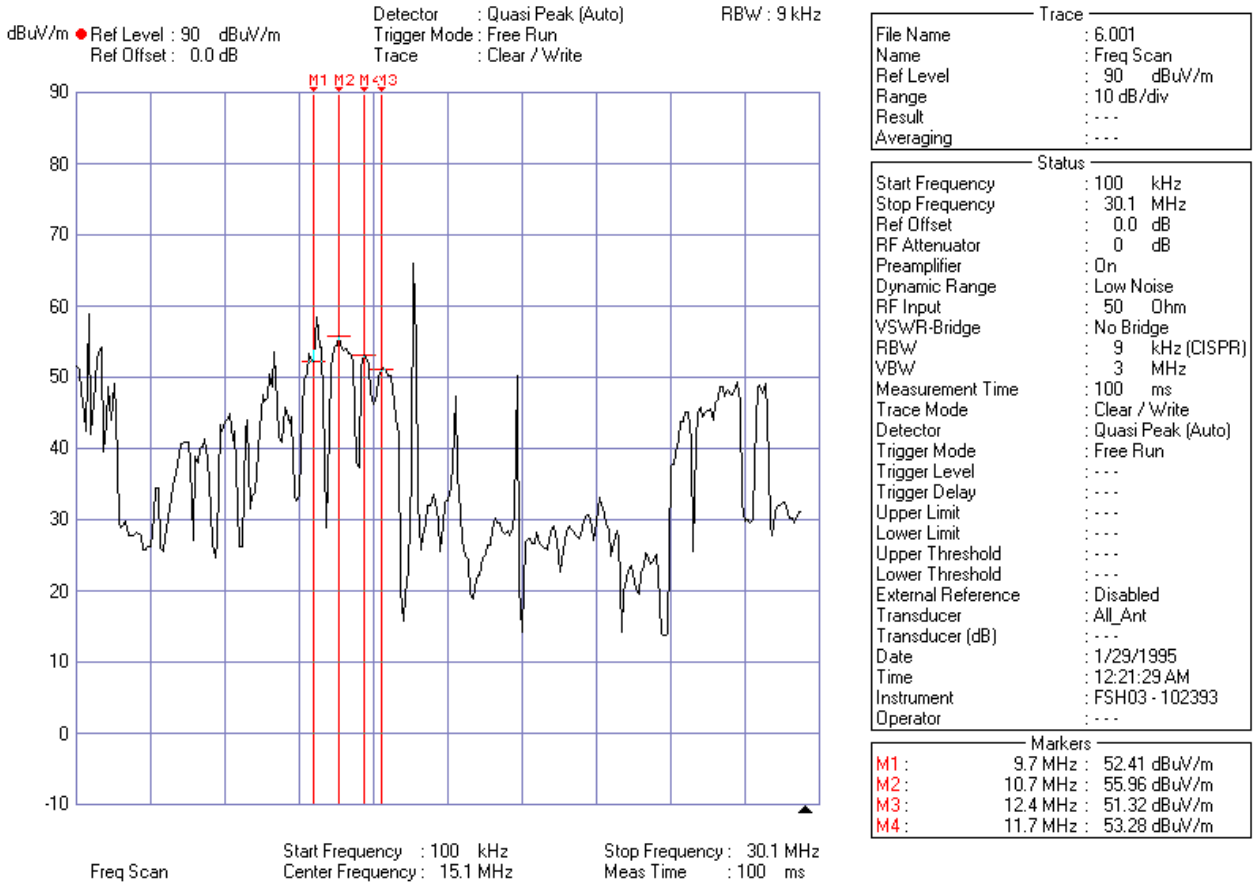
[13] The nearest lines carrying BPL were on private property and not accessible. The estimate of distance is very approximate.
[14] Because the distance to the line is greater than 30 meters and the frequency is in the upper part of the frequency range, ARRL applied a 20 log extrapolation factor, resulting in an estimate of field strength that is somewhat lower than would be obtained with a 40 log factor.

Re-measurement results – December 6, 2010

Measurement results: 1.705 to 30 MHz

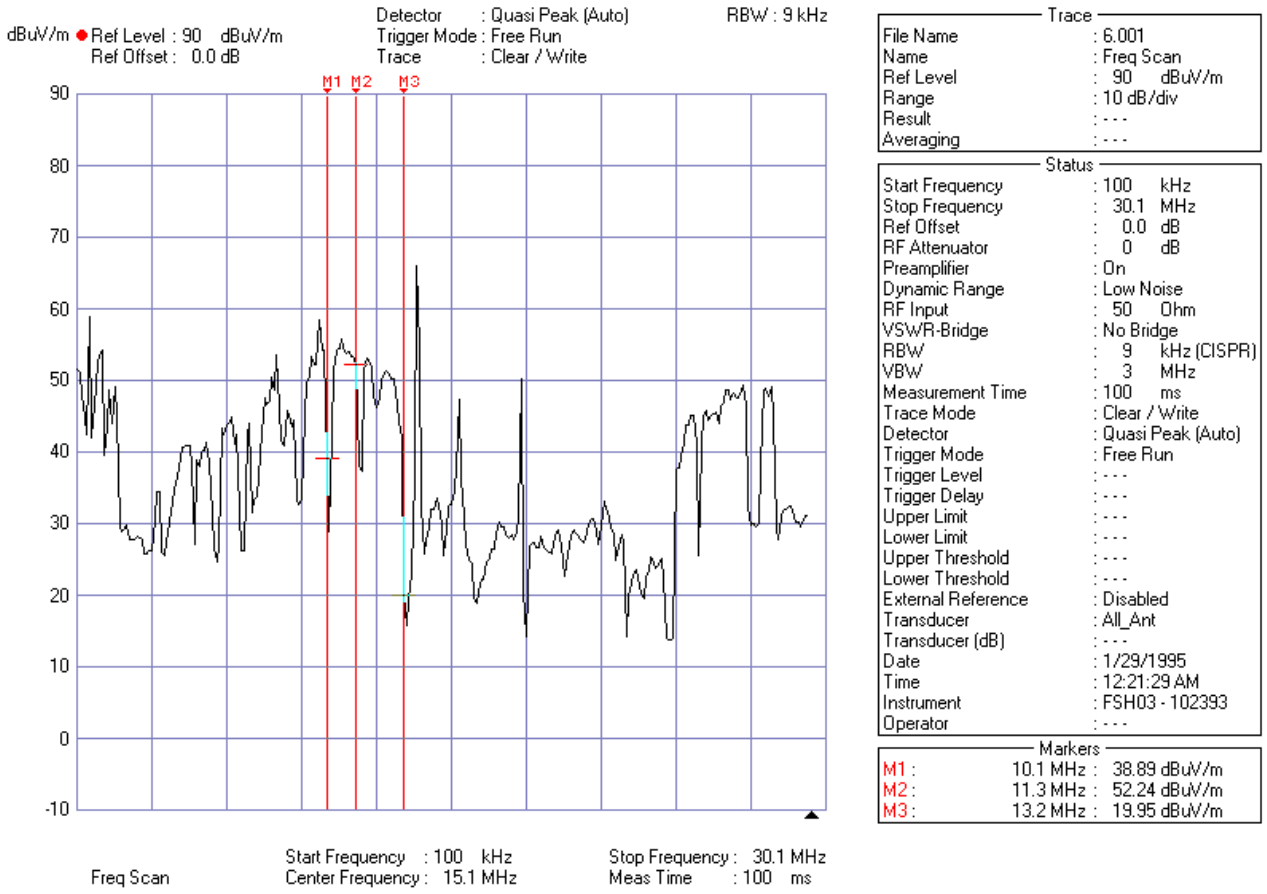
This general area was re-tested on December 6, 2010, at a location on Mountain Road, Afton, VA.

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Mountain Rd, Afton, VA
Date: December 6, 2010
Horizontal distance to EUT, premise or overhead line: 8 meters (estimate)
Height of overhead line (if applicable): 10 meters (estimate)
Slant range distance: 12.2 meters
Slant range distance correction (40 log): -15.6 dB



Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 6 highest readings (MHz)	9.7	10.7	12.4	11.7	--	--
Quasi peak spectrum analyzer voltages (dBμV)	52.4	56.0	51.3	53.3	--	--
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	--	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	--	--
Slant range distance correction (40log 30/X) (dB)	-15.6	-15.6	-15.6	-15.6	--	--
Corrected E-Field Strength (dBμV/m @ 30m)	36.9	40.5	35.8	37.8	--	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	--	--
Test margin (dB)	+7.4	+11.0	+6.3	+8.3	--	--
Test Results: FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	--	--

As seen in the graph below, this was the only location tested in the area that showed evidence of an attempt to notch the bands protected by §15.615(f)(1).



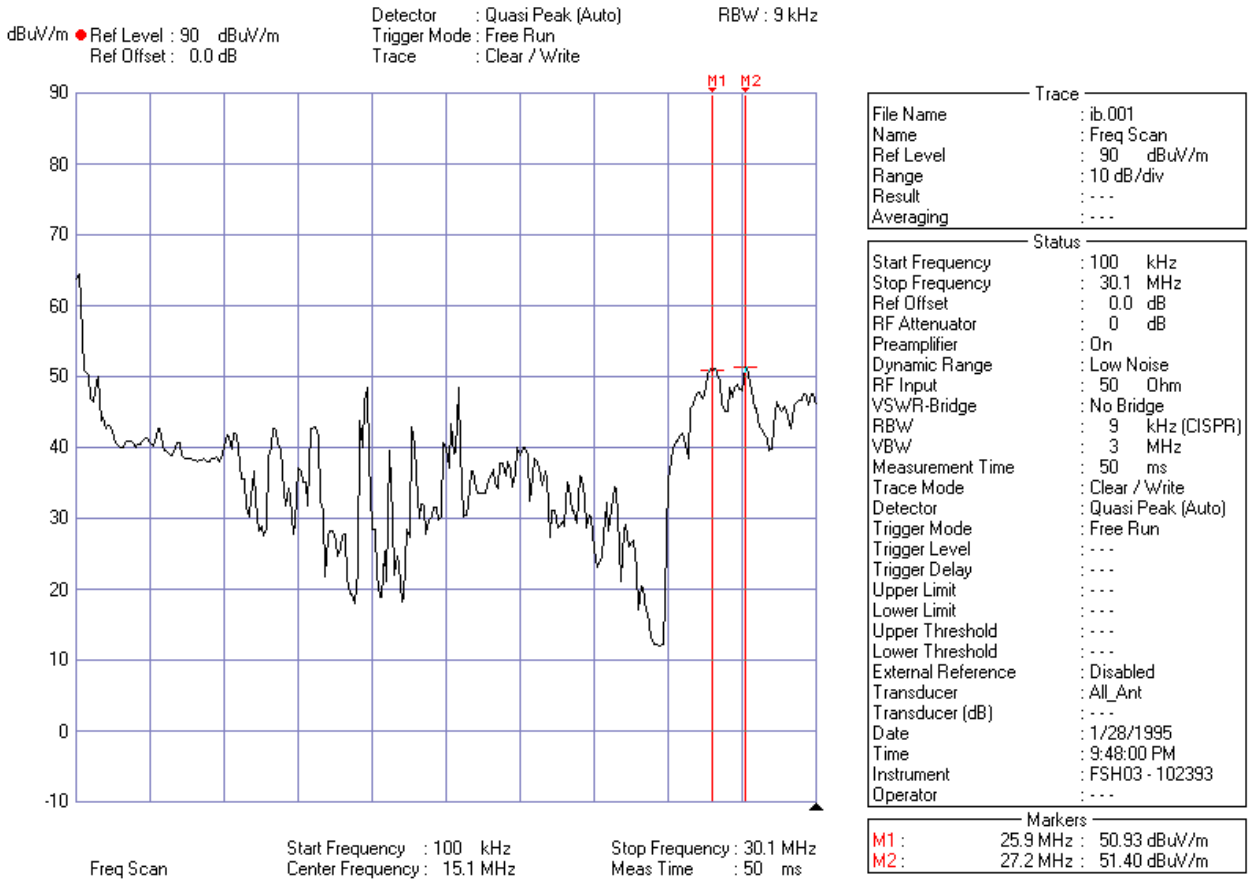
Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 6 highest readings (MHz)	10.1	11.3	13.2	--	--	--
Quasi peak spectrum analyzer voltages (dBμV)	38.9	52.4	20.0	--	--	--
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	--	--	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	--	--	--
Slant range distance correction (40log 30/X) (dB)	-15.6	-15.6	-15.6	--	--	--
Corrected E-Field Strength (dBμV/m @ 30m)	23.4	36.9	4.5	--	--	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	9.5	9.5	9.5	--	--	--
Test margin (dB)	+13.9	+27.4	-5.0	--	--	--
Test Results: FAIL	**FAIL**	**FAIL**	**PASS**	--	--	--

Location #6 – 2417 Cove Mountain Road, Lovingston, VA

Photo/map of test site

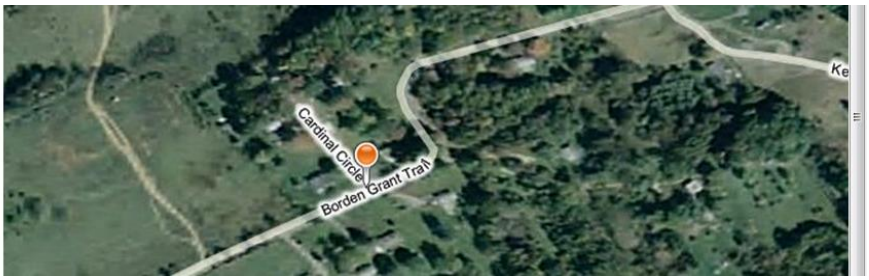
Measurement results: 1.705 to 30 MHz

Test description: Measurement of overhead MV line carrying BPL signal
Test location: 2417 Mountain Cove Rd, Lovingston, VA
Date: December 7, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters (estimate)
Height of overhead line (if applicable): 8 meters (estimate)
Slant range distance: 12.2 meters
Slant range distance correction (40 log): -15.6 dB



Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 2 highest readings (MHz)	25.9	27.2	--	--	--	--
Quasi peak spectrum analyzer voltages (dBμV)	50.9	51.4	--	--	--	--
Cable loss at the measurement frequency (dB)	0.1	0.1	--	--	--	--
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	--	--	--	--
Slant range distance correction (40log 30/X) (dB)	-15.6	-15.6	--	--	--	--
Corrected E-Field Strength (dBμV/m @ 30m)	35.4	35.9	--	--	--	--
Test margin (dB)	+5.9	+6.4	--	--	--	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	--	--	--	--
Test Results: FAIL	**FAIL**	**FAIL**	**--**	--	--	--

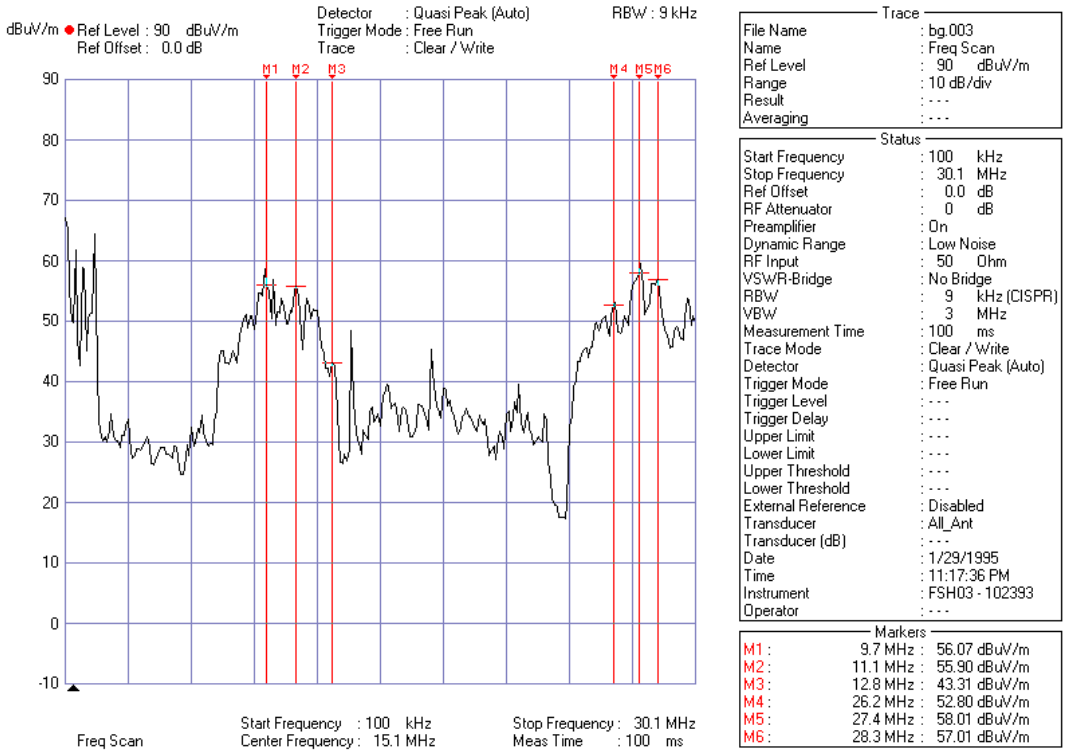
Location #7 – Borden Grant Trail and Cardinal Circle, near Fairfield, VA



Photo/map of test site

Measurement results: 1.705 to 30 MHz

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Intersection of Borden Grant Trail and Cardinal Circle, near Fairfield, VA
Date: December 7, 2010
Horizontal distance to EUT, premise or overhead line: 10.1 meters
Height of overhead line (if applicable): 8 meters (estimate)
Measurement height: 2 meters
Slant range distance: 11.7 meters
Slant range distance correction (40 log): -16.4 dB



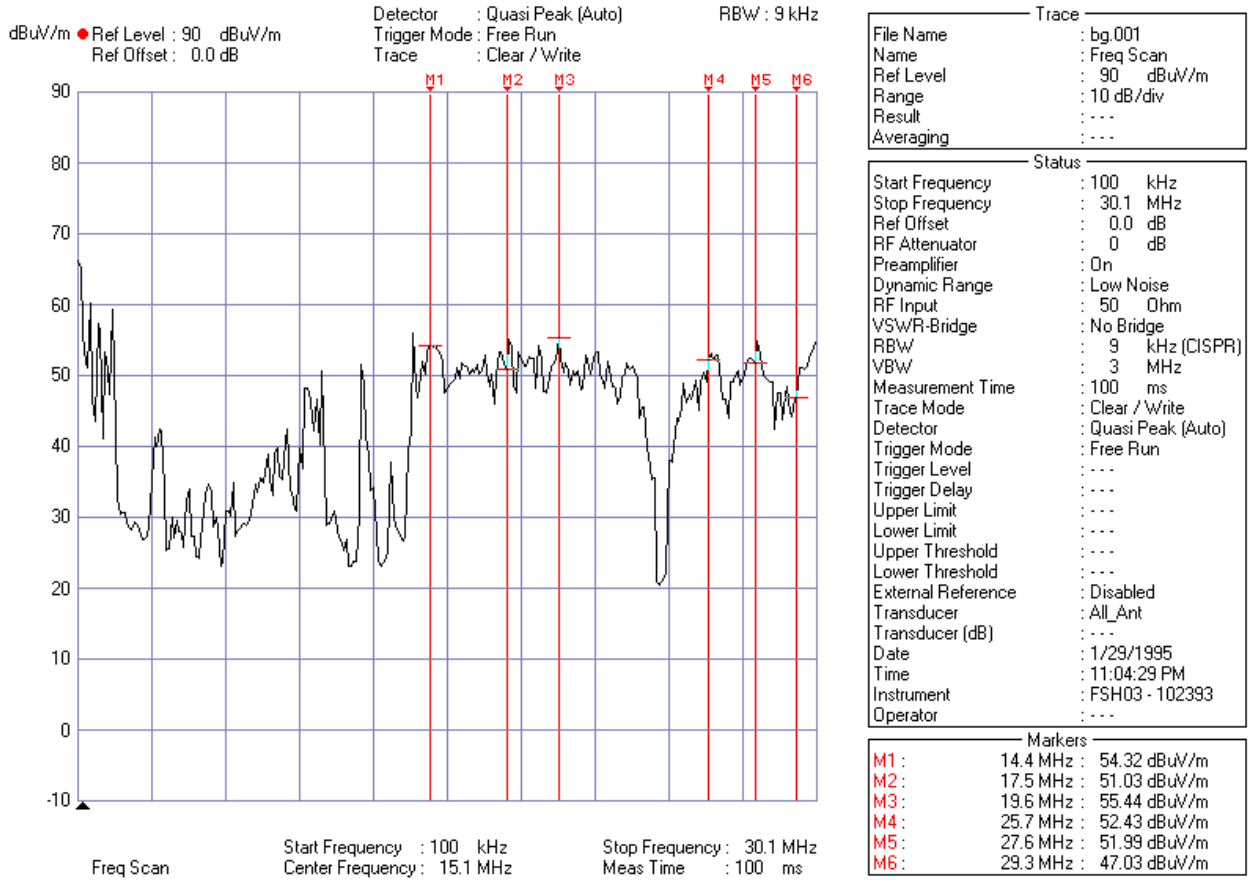
Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 3 highest readings (MHz)	9.7	11.1	12.8	26.2	27.4	28.3
Quasi peak spectrum analyzer voltages (dBμV)	56.1	55.9	43.3	52.8	58.0	57.0
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	0.1
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	n/a
Slant range distance correction (40log 30/X) (dB)	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4
Corrected E-Field Strength (dBμV/m @ 30m)	39.8	39.6	27.0	36.5	41.7	40.7
Test margin (dB)	+10.3	+10.1	-2.5	+7.0	+12.2	+11.2
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test Results: FAIL	**FAIL**	**FAIL**	**PASS**	**FAIL**	**FAIL**	**FAIL**

Location #8 – 4516 Borden Grant Trail, Fairfield, VA

Photo/map of test site

Measurement results: 1.705 to 30 MHz

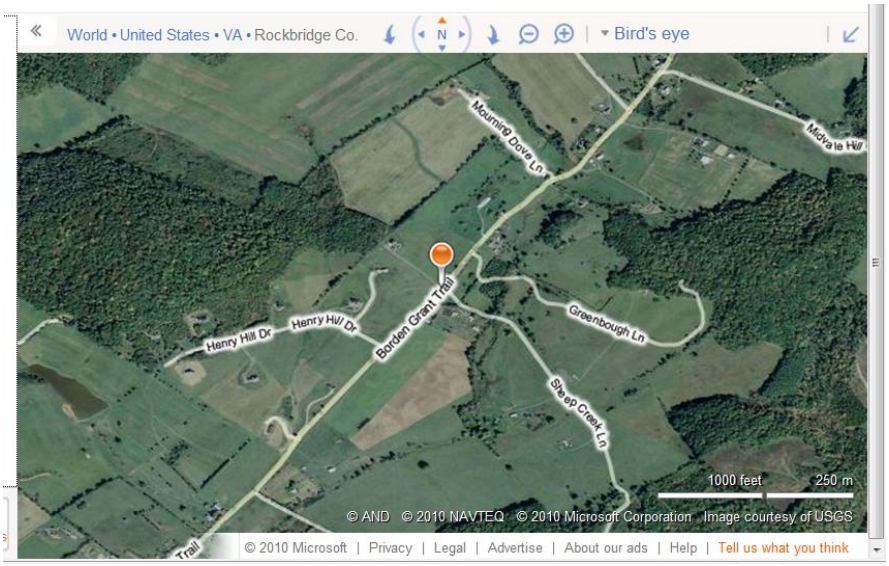
Test description: Measurement of overhead MV line carrying BPL signal
Test location: 4516 Borden Grant Trail, Fairfield, VA
Date: December 7, 2010
Horizontal distance to EUT, premise or overhead line: 8 meters (estimate)
Height of overhead line (if applicable): 8 meters (estimate)
Measurement height: 2 meters
Slant range distance: 10 meters
Slant range distance correction (40 log): -19.1 dB



Field Strength 1.705 MHz to 30 MHz (from spectral plot)						
Frequencies of 3 highest readings (MHz)	14.4	17.5	19.6	25.7	27.6	29.3
Quasi peak spectrum analyzer voltages (dBμV)	54.3	51.0	55.4	52.4	52.0	47.0
Cable loss at the measurement frequency (dB)	0.1	0.1	0.1	0.1	0.1	0.1
Antenna Factor @ measurement frequency (dB/m)	n/a	n/a	n/a	n/a	n/a	n/a
Slant range distance correction (40log 30/X) (dB)	-19.1	-19.1	-19.1	-19.1	-19.1	-19.1
Corrected E-Field Strength (dBμV/m @ 30m)	35.3	32.0	36.4	33.4	33.0	28.0
Test margin (dB)	+5.8	+2.5	+6.9	+3.9	+3.5	-1.5
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test Results: FAIL[15]	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**PASS**

[15] For this measurement distance and extrapolation, this location's emissions are within a reasonable measurement uncertainty of meeting the limits.

Location #9 – 2178 Borden Grant Trail, Fairfield, VA



Photo/map of test site

Measurement results: 1.705 to 30 MHz

Test description: Measurement of overhead MV line carrying BPL signal
Test location: 2178 Borden Grant Trail, Fairfield, VA
Date: December 7, 2010
Horizontal distance to EUT, premise or overhead line: 8 meters (estimate)
Height of overhead line (if applicable): 8 meters (estimate)
Measurement height: 2 meters
Slant range distance: 10 meters
Slant range distance correction (40 log): -19.1 dB

<No spectral sweep was performed at this location>

Field Strength 1.705 MHz to 30 MHz (from single measurement)						
Frequencies of 1 highest reading (MHz)	5.6	--	--	--	--	--
Quasi peak spectrum analyzer voltages (dBμV)	58.5	--	--	--	--	--
Cable loss at the measurement frequency (dB)	0.1	--	--	--	--	--
Antenna Factor @ measurement frequency (dB/m)	n/a	--	--	--	--	--
Slant range distance correction (40log 30/X) (dB)	-19.1	--	--	--	--	--
Corrected E-Field Strength (dBμV/m @ 30m)	39.5	--	--	--	--	--
Test margin (dB)	+10.0	--	--	--	--	--
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	--	--	--	--	--
Test Results: FAIL	**FAIL**	**--**	**--**	**--**	**--**	**--**

Note: At this location, vehicle parking did not appear to be safe. A single measurement was made along the power line, while in motion, recording the level of the strongest emission along the line, within 10 meters of the BPL injection coupler.

Test Location #10 – Other areas in the environment of Fairfield, VA

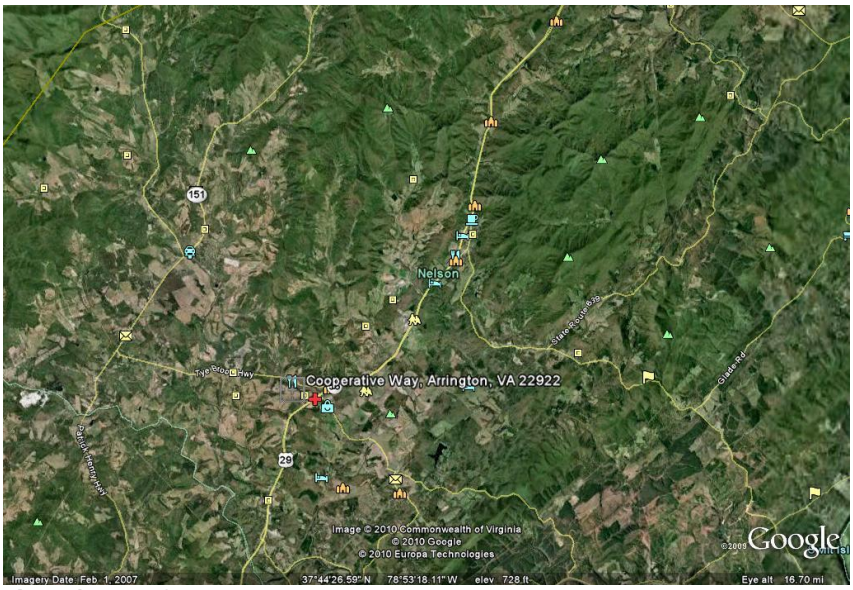
In addition to the measured points, the use of spectrum by BPL was investigated in the general vicinity. Strong noise in the Amateur bands and in the prohibited bands from BPL radiated emissions along sections of Borden Grant Trail and South River Road, and connecting cross roads was observed. There was no evidence of Amateur or §15.615(f)(1) notching in any part of this system.

Test Location #11 – Somerset, PA and environs

On December 8, 2010, a site visit to Somerset, PA was performed. There was heavy lake-effect snow occurring at the time, with approximately 8" of snow on the ground. Road conditions were somewhat slippery and with the snow plowed to the side of the road, side of road parking was not possible. For that reason, no measurements were performed at this location at this time. A drive-around survey showed strong noise in the Amateur bands and in the prohibited bands from BPL along sections of Water Level Road, Chickentown Road and other roads in the vicinity. The levels observed on the signal-strength meter of the communications receiver used for the testing were consistent with those noted in the areas measured in the Lovingston, VA area. There was no decrease in signal strength in those parts of the system that operated above 30 MHz, so it is presumed that this system is operating significantly above the radiated emission limits above 30 MHz.

There was no evidence of Amateur band notching, nor the notching required by §15.615(f)(1) of the FCC rules in any part of this system.

Test location #12 – Unspecified location along I-28



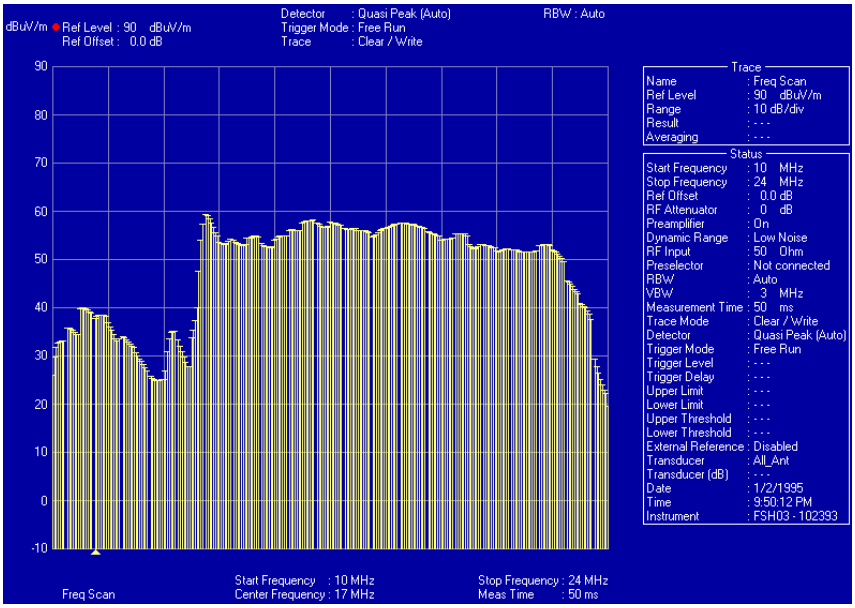
Photo/map of test area

Measurement results: 1.705 to 30 MHz

Test description: Measurement of overhead MV line carrying BPL signal
Test location: Unspecified location along I-29, north of the CVEC administrative building
Date: March 5, 2010 through March 8, 2010
Horizontal distance to EUT, premise or overhead line: 10 meters (approximate)[16]
Height of overhead line (if applicable): 10 meters (see footnote)
Slant range distance: N/A

Note: The following graph is representative of the lack of notching of the Amateur bands and the spectrum protected by §15.615(f)(1) throughout the three IBEC BPL installations. Measurements or estimates of slant-range distance were not made, although from the signal levels, this level is consistent with the excessive emissions at other locations. The lack of notches was widespread throughout all three systems.

[16] The nearest lines carrying BPL were on private property and not accessible. The estimate of distance is approximate.



The graph that shows the lack of notching shows frequency use significantly different from the information IBEC and CVEC have entered into the BPL database, shown below for ZIP code 22922. The system is not notched on the frequencies the database claims to be notched:

Found Active Companies

We found **1** company listed as operating within zip code *22922*

IBEC Inc.

Contact Name: Steve Turner

Phone: 256-492-1000

Email: steven.turner@ibec.net

Street Address: P. O. Box 2042
Gadsden, AL 35903

Operational Zip: 22922

Details:

Frequency	Manufacturer	Model	Start Date
2.0 - 34.0	Corinex Communications; Kaicom Communications; IBEC, Inc.	Corinex Medium-Voltage Gateway; Kaicom Medium-Voltage Equipment Models 2210, 2220E, & 2330; IBEC Customer Access Unit and BPL Regenerator Unit	2006-06-17

Notes: Corinex Medium-Voltage Gateway FCC ID: QIUCXP-MVA-GWY, granted Part 15G Certification on 09/28/2006. Kaicom Medium Voltage Equipment 2210 - FCC ID: UGN-KPI-2210, granted Part 15G Certification on 03/08/2007; 2220E - FCC ID: UGN-KPI-2220E, granted Part 15G Certification on 01/12/2007; and 2330 - FCC ID: UGN-KPI-2330, granted Part 15G Certification on 01/09/2007; IBEC Customer Access Unit FCC ID: U9TLCCAU10007, granted Part 15G Certification on 08/24/07; IBEC BPL Regenerator Unit FCC ID: U9TBRUG320007, granted Part 15G Certification on 10/01/07. All appropriate Amateur Radio and Public Safety Frequencies are Notched in Compliance with FCC Part 15 Requirements.

47 C.F.R. Section 15.615(f)(1) reads as follows:

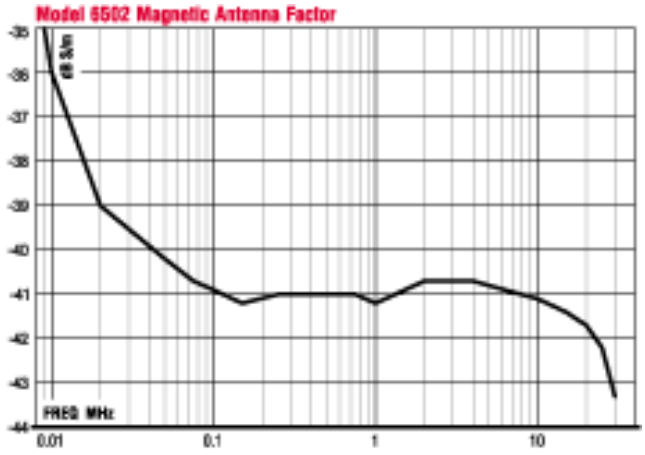
(1) *Excluded Bands.* To protect Aeronautical (land) stations and aircraft receivers, Access BPL operations using overhead medium voltage power lines are prohibited in the frequency bands listed in Table 1. Specifically, such BPL systems shall not place carrier frequencies in these bands

.

TABLE 1—EXCLUDED FREQUENCY BANDS

Frequency band
2,850–3,025 kHz
3,400–3,500 kHz
4,650–4,700 kHz
5,450–5,680 kHz
6,525–6,685 kHz
8,815–8,965 kHz
10,005–10,100 kHz
11,275–11,400 kHz
13,260–13,360 kHz
17,900–17,970 kHz
21,924–22,000 kHz
74.8–75.2 MHz

Antenna factors:



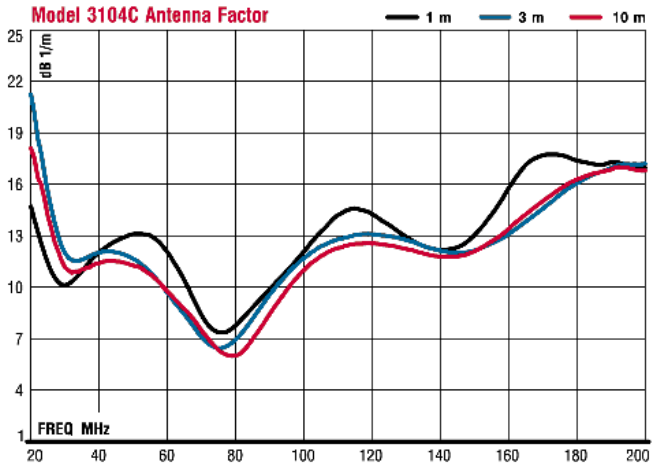


Exhibit B

arc technical resources
engineering services

2006 Lockwood Drive, San Jose, CA 95132

www.arctechnical.com
(408) 263-6486

03/26/10

Broadband over Power Lines (BPL)
Simplified Radiated Emissions Testing
(Access Overhead)
FCC Method (1m measurement height)

Access BPL Equipment Under Test: (EUT)
Lake Edgewood Access Overhead Injector – Head End near Water District Office; Martinsville, IN

Applicable Standards:	
ANSI C63.4 (2003)	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
47CFR15 subpart G (2004)	Specified in FCC Report & Order 04-245 "Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems" released October 28, 2004
IEEE-P1775 / D2 (2006)	Draft Standard for Broadband Power line Communication Equipment – Electromagnetic Compatibility (EMC) Requirements – Testing and Measurements Methods (June, 2006)

EUT INFORMATION	
Type of Device being tested	Corinex Medium-Voltage Gateway FCC ID: QIUCXP-MVA-GWY
Serial Number	
Model Number(s)	Models 2210, 2220E, & 2330
Designation	DS2 gateways, regenerators & bridges, typical in this deployment
Modulation type	OFDM
Number of carriers	
Carrier spacing	1.1kHz
Upstream / Downstream Channels	
Lowest external frequency used	2MHz
Highest external frequency used	34MHz
Carrier On-Off capable?	
Power setting during tests	Operational
GPS location of device	N39° 26.9826´ W86° 26.7947´
Rep rate of data	
IBEC, Inc. claims:	*"All appropriate Amateur Radio and Public Safety Frequencies are Notched in Compliance with FCC Part 15 Requirements."*

EMISSIONS LIMITS (United States)		
Test	**Frequency Range**	**Field Strength Limit**
Radiated Emissions	1.705 MHz – 30 MHz	**29.5 dBuV/m** @ 30 meters*
	30 MHz - 80 MHz	**39.1 dBuV/m** @ 10 meters*
***** Installations are measured at slant-range distances other than those listed. The dB value to subtract from the measured values in the United States are calculated using these formulas: $40\log_{10}$ 30m/d_n for frequencies below 30MHz $20\log_{10}$ 10m/d_n for frequencies above 30MHz		

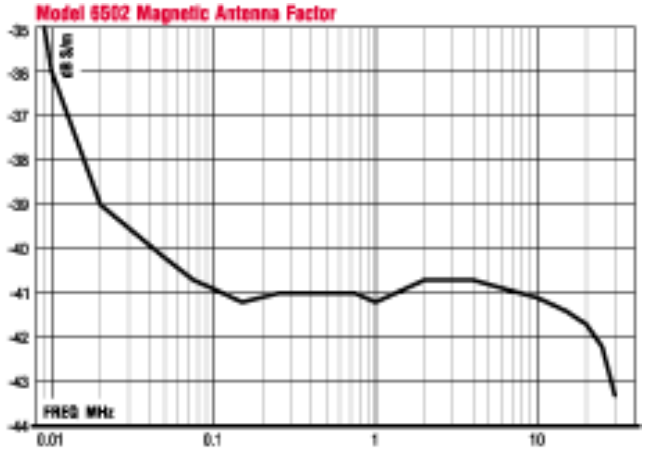
TEST EQUIPMENT				
Manufacturer	**Description**	**Model Number**	**Serial Number**	**Calibration**
Rohde & Schwarz	EMC Spectrum Analyzer	FSH3 opt. K1, K3, Z21, Z25		(yearly)
Yaesu	Portable receiver	FT-817		N/A
ICOM	Portable receiver			N/A
MFJ	HF whip antenna w/ tuner			N/A
	RG-58/U cable (25' spool)			N/A
ETS	Active loop antenna (internal preamplifier)	6502		(yearly)
ETS	Biconical antenna	3104C		(yearly)
	Non-metallic tripod		N/A	N/A
Stanley	Optical range-finder			N/A
Lufkin	Non-conductive tape measure	100'	N/A	N/A

Supporting Documentation:

Cable Loss Table
Transducer Name,25F
Description,25-foot RG-58
Unit,dB
1, 1000000, .1
2, 2000000, .1
3, 5000000, .2
4, 10000000, .4
5, 15000000, .4
6, 20000000, .5
7, 30000000, .5
8, 50000000, .65
9, 100000000, 1.1
10, 200000000, 1.6
11, 300000000, 2
12, 500000000, 2.6

Electric Antenna Factor for 6502:
Description,6502 and 3104C
#,(Hz),dBuV/m
1, 9000, 19.5
2, 10000, 18.7
3, 20000, 14.1
4, 50000, 11.2
5, 75000, 10.9
6, 100000, 11
7, 150000, 10.9
8, 250000, 10.9
9, 500000, 10.9
10, 750000, 10.9
11, 1000000, 11
12, 2000000, 10.8
13, 3000000, 10.5
14, 4000000, 10.4
15, 5000000, 10.4
16, 10000000, 9.8
17, 15000000, 9.4

```
18, 20000000, 8.9
19, 25000000, 8.1
20, 30000000, 6.8
```



Testing below 30MHz:

Set spectrum analyzer to PEAK detection, 9kHz IF bandwidth, 2MHz center frequency, 100kHz/div. Tune across band from 1.705 – 30MHz looking for BPL signals, demodulate and analyze signature to verify candidates. (Center frequencies of 2, 3, 4, 5, 6, etc. selected every 1MHz from 2-30MHz)

Distance Correction Table

$40\log_{10}$ 30m/d_n for frequencies below 30MHz

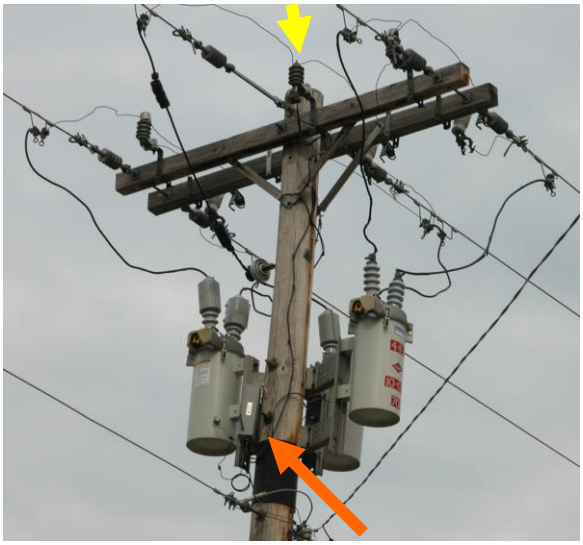
Slant-Distance to wires or transformer (Meters)	**English Equivalent distance (Feet & Inches)**	**Distance Extrapolation Factor (dB)**
3	9’ 10”	40 dB
5	16’ 5”	31.1 dB
10	32’ 10”	19.1 dB
11	36’ 1”	17.4 dB
12	39’ 4”	15.9 dB
13	42’ 8”	14.5 dB
14	**45’ 11”**	**13.2 dB**
15	49’ 3”	12.0 dB
16	52’ 6”	10.9 dB
17	55’ 9”	9.9 dB
18	59’ 1”	8.9 dB
19	62’ 4”	7.9 dB
20	65’ 7”	7.0 dB

Field Strength 1.705 MHz – 30 MHz @ 10 meters lateral distance						
Frequencies of six (6) highest readings: (**MHz**)	**3.24**	**3.91**	**5.20**	**9.80**	**29.34**	**29.96**
Receiver voltages (dBuV) (**QUASI-PEAK**)	39.0	42.8	40.2	47.0	39.2	41.0
Cable loss at the measurement frequency: (dB)	+0.2	+0.2	+0.2	+0.4	+0.5	+0.5
Antenna Factor @ measurement frequency: (dB)	-41.0	-41.1	-41.1	-41.7	-44.7	-44.7
E-Field conversion of magnetic loop readings (dB)	+51.5	+51.5	+51.5	+51.5	+51.5	+51.5
Slant range distance correction (40log 30/X) (dB)	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2
(subtract distance correction) **Corrected E-Field Strength (dBuV/m @ 30m)**	**36.5**	**40.2**	**37.6**	**44.0**	**33.3**	**35.1**
FCC Limit Field Strength (dBuV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test Results: PASS / FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**

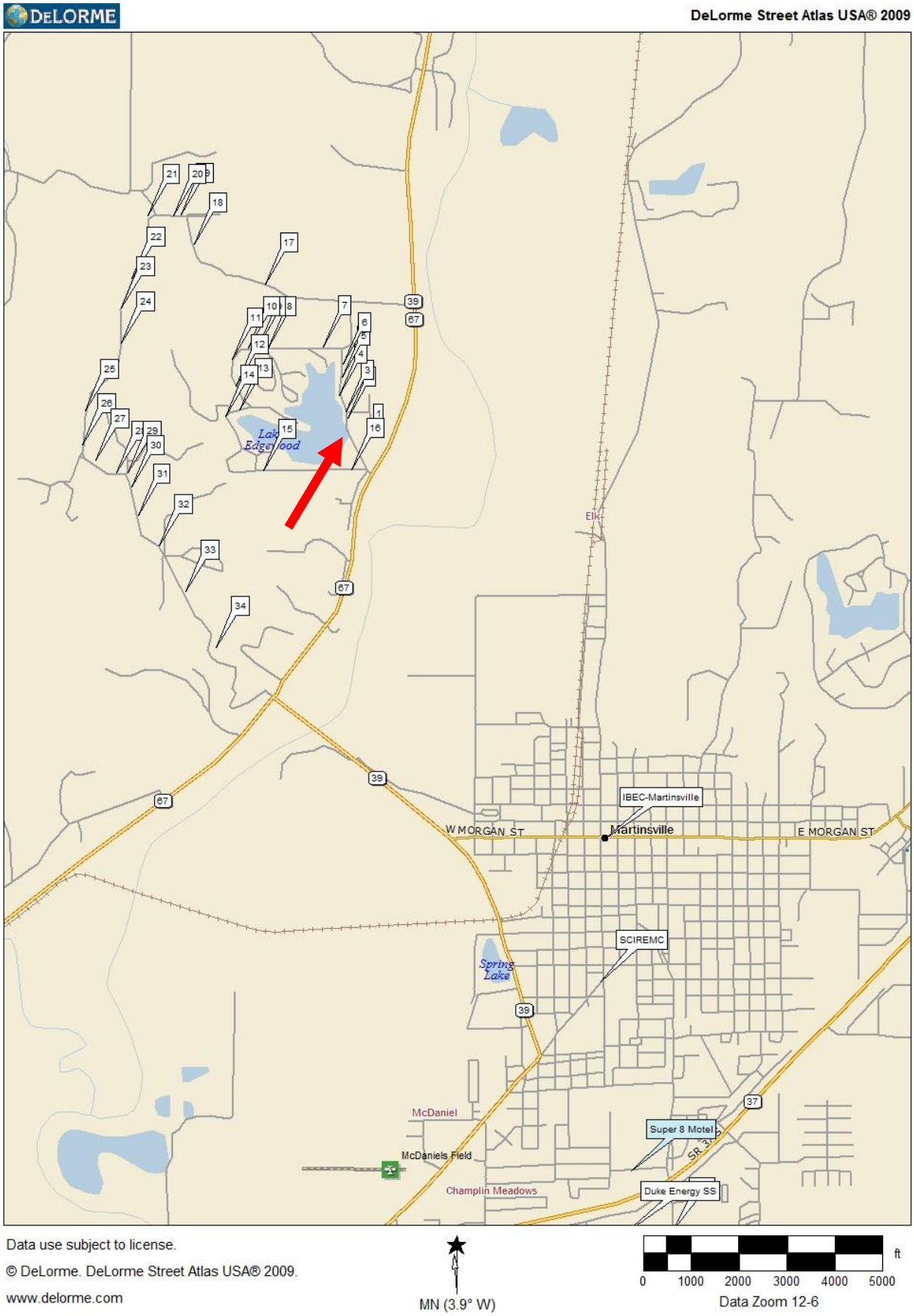
Field Strength 1.705 MHz – 30 MHz @ 27 meters lateral distance						
Frequencies of six (6) highest readings: (**MHz**)	**3.24**			**9.80**		**29.96**
Receiver voltages (dBuV) (**QUASI-PEAK**)	26.9			28.5		28.7
Cable loss at the measurement frequency: (dB)	+0.2			+0.4		+0.5
Antenna Factor @ measurement frequency: (dB)	-41.0			-41.7		-44.7
E-Field conversion of magnetic loop readings (dB)	+51.5			+51.5		+51.5
Slant range distance correction (40log 30/X) (dB)	-0.0			-0.0		-0.0
(subtract distance correction) **Corrected E-Field Strength (dBuV/m @ 30m)**	**37.6**			**38.7**		**36.0**
FCC Limit Field Strength (dBuV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test Results: PASS / FAIL	**FAIL**			**FAIL**		**FAIL**

Orange arrow shows BPL gateway, yellow arrow shows capacitive coupler.

Blue arrow shows antenna position at 10m lateral distance, green arrow shows position for 27m distance.



GPS map of measurement location: (tag #1 at end of red arrow)



Assessment of BPL Operation in Excluded Frequency Bands

EXCLUDED FREQUENCY BAND	CONTENT
2,850 – 3,025 kHz	**BPL**
3,400 – 3,500 kHz	Power line gap noise
4,650 – 4,700 kHz	Power line gap noise
5,450 – 5,680 kHz	**BPL**
6,525 – 6,685 kHz	Power line gap noise
8,815 – 8,965 kHz	Power line gap noise
10,005 – 10,100 kHz	Power line gap noise
11,275 – 11,400 kHz	Power line gap noise
13,260 – 13,360 kHz	Power line gap noise
17,900 – 17,970 kHz	Power line gap noise
21,924 – 22,000 kHz	Power line gap noise
74.8 – 75.2 MHz	Not assessed

Field Strength in Exclusion Bands @ 10 meters lateral distance						
Frequencies of six (6) highest readings: (**MHz**)	**2.88**		**5.63**			
Receiver voltages (dBμV) (**QUASI-PEAK**)	35.1		26.2			
Cable loss at the measurement frequency: (dB)	+0.2		+0.2			
Antenna Factor @ measurement frequency: (dB)	-41.0		-41.1			
E-Field conversion of magnetic loop readings (dB)	+51.5		+51.5			
Slant range distance correction (40log 30/X) (dB)	-13.2		-13.2			
(subtract distance correction) **Corrected E-Field Strength (dBμV/m @ 30m)**	**32.6**		**23.6**			
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5		29.5	29.5	29.5	29.5
Test Results: PASS / FAIL	**FAIL 4dB notch**		**FAIL 14dB notch**			

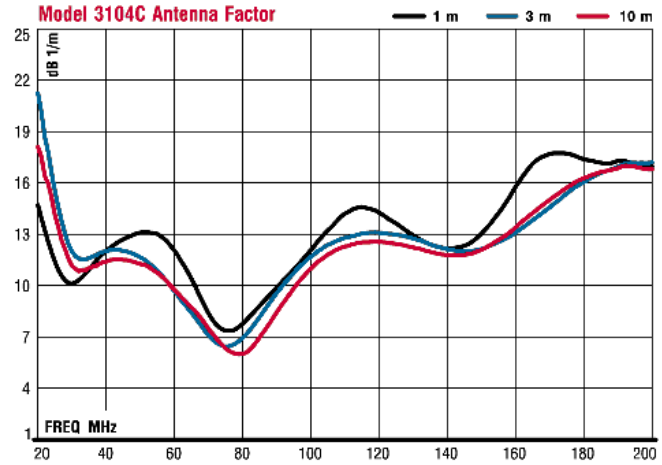
Assessment of BPL Operation in Amateur Bands

AMATEUR BAND	CONTENT
160 Meters (1.8-2.0 MHz)	S5 gap noise
80 Meters (3.5-4.0 MHz)	S5 gap noise
40 Meters (7.0-7.3 MHz)	S5 gap noise
30 Meters (10.1-10.15 MHz)	S5 gap noise
20 Meters (14.0-14.35 MHz)	S5 gap noise
17 Meters (18.068-18.168 MHz)	S5 gap noise
15 Meters (21.0-21.45 MHz)	**BPL**
12 Meters (24.89-24.99 MHz)	**BPL**
10 Meters (28-29.7 MHz)	**BPL**

Field Strength in Amateur Bands @ 10 meters lateral distance						
Frequencies of six (6) highest readings: (**MHz**)				**21.20**	**24.98**	**28.37**
Receiver voltages (dBμV) (**QUASI-PEAK**)				27.0	36.6	40.3
Cable loss at the measurement frequency: (dB)				+0.5	+0.5	+0.5
Antenna Factor @ measurement frequency: (dB)				-41.7	-44.7	-44.7
E-Field conversion of magnetic loop readings (dB)				+51.5	+51.5	+51.5
Slant range distance correction (40log 30/X) (dB)				-13.2	-13.2	-13.2
(subtract distance correction) **Corrected E-Field Strength (dBμV/m @ 30m)**				**24.1**	**30.7**	**34.4**
FCC Limit Field Strength (dBμV/m @ 30 meters)	29.5	29.5	29.5	29.5	29.5	29.5
Test Results: PASS / FAIL				**FAIL 9dB notch**	**FAIL <3dB notch**	**FAIL No notch**

Testing above 30MHz:

Set spectrum analyzer to PEAK detection, 120 kHz IF bandwidth, 35MHz center frequency, 1MHz/div. Tune across band from 30 – 80 MHz looking for BPL signals, demodulate and analyze signature to verify candidates. (Center frequencies of 35, 45, 55, 65, 75 MHz) Measure both vertically and horizontally, report worst case.



Electric Antenna Factor for 3104C @ 10 meters

```
21, 30000000, 11
22, 35000000, 11
23, 40000000, 11.4
24, 45000000, 11.4
25, 50000000, 11.1
26, 55000000, 10.5
27, 60000000, 9.7
28, 65000000, 8.6
29, 70000000, 7.5
30, 75000000, 6.4
31, 80000000, 6.1
32, 85000000, 6.9
33, 90000000, 8.3
34, 100000000, 9.6
35, 105000000, 10.9
36, 110000000, 11.7
37, 115000000, 12.3
38, 120000000, 12.6
39, 125000000, 12.7
40, 130000000, 12.6
41, 135000000, 12.5
42, 140000000, 12.2
43, 145000000, 12
44, 150000000, 12
45, 155000000, 12.1
46, 160000000, 12.5
47, 165000000, 13.2
48, 170000000, 13.9
49, 175000000, 14.6
50, 180000000, 15.4
51, 185000000, 16
52, 190000000, 16.5
53, 195000000, 17
54, 200000000, 16.9
55, 3000000000, 16.9
```

Distance Correction Table

$20\log_{10}$ 10m/d_n for frequencies above 30MHz

Slant-Distance to wires or transformer (Meters)	English Equivalent (Feet & Inches)	Distance Extrapolation Factor (dB)
3	9' 10"	10.5 dB
5	16' 5"	6 dB
10	32' 10"	0 dB
11	36' 1"	-0.8 dB
12	39' 4"	-1.6 dB
13	42' 8"	-2.3 dB
14	**45' 11"**	**-2.9 dB**
15	49' 3"	-3.5 dB
16	52' 6"	-4.1 dB
17	55' 9"	-4.6 dB
18	59' 1"	-5.1 dB
19	62' 4"	-5.6 dB
20	65' 7"	-6 dB

Field Strength 30 MHz– 80 MHz @ 10 meters lateral distance						
Frequencies of six highest readings: (**MHz**)	**30.14**	**30.55**	**31.45**	**31.57**	**31.82**	**31.98**
Receiver voltages (dBuV) (**QUASI-PEAK**)	36.2	37.0	37.0	36.8	36.7	37.8
Cable loss at the measurement frequency: (dB)	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
Antenna Factor @ measurement frequency: (dB)	+11.0	+11.0	+11.0	+11.0	+11.0	+11.0
Height conversion E-Field (+5 dB overhead only)	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0
Slant range distance correction (20log 10/X) (dB)	+2.9	+2.9	+2.9	+2.9	+2.9	+2.9
(subtract distance correction) (subtracting a negative = adding a positive) **Corrected Worst Case Field (dBuV/m @ 10m)**	**55.6**	**56.4**	**56.4**	**56.2**	**56.1**	**57.2**
FCC Limit Field Strength (dBuV/m @ 10 meters)	39.1	39.1	39.1	39.1	39.1	39.1
Test Results: PASS / FAIL	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**

Cumulative Test Results:	**FAIL**
Name & Address of Testing Organization:	**ARC Technical Resources, Inc.** 2006 Lockwood Drive San Jose, CA 95132-1322 (408) 263-6486 jramie@arctechnical.com
Test Engineer's Signature: 	**Jerry Ramie** President NARTE-certified EMC Technician # EMC-002600-NT Certification Expires 11/30/11
Date:	**03/26/10**