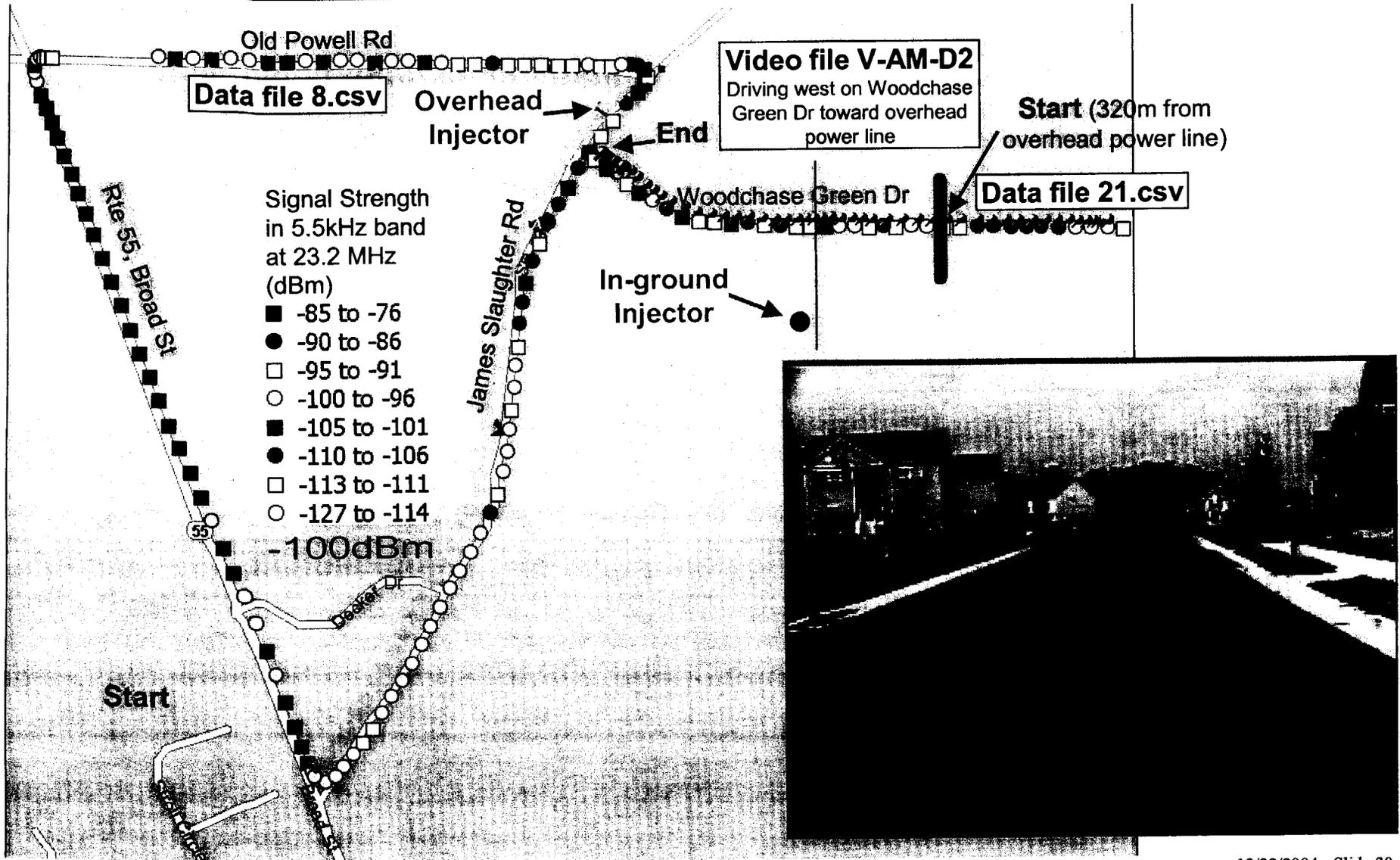


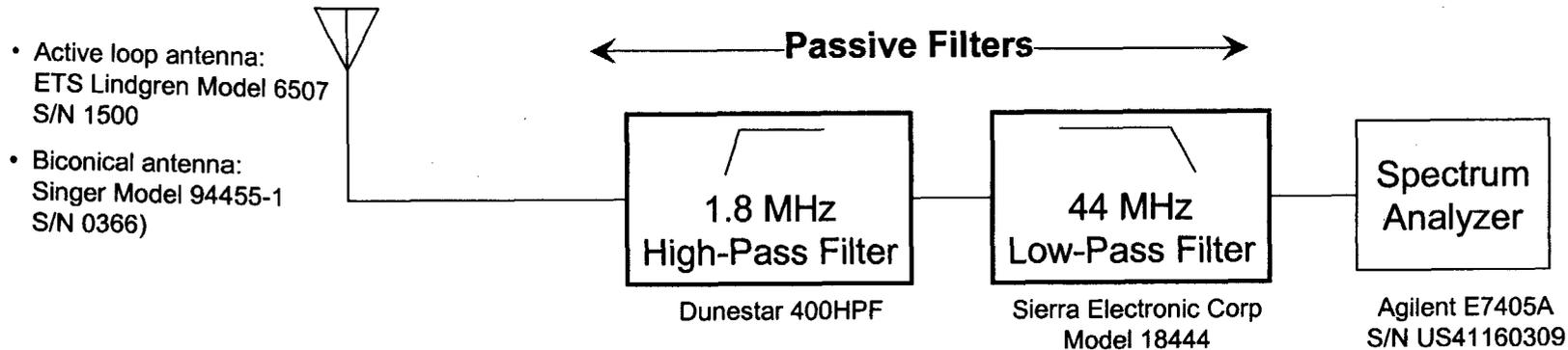
# Video Example

FCC Laboratory



# BPL Notching

# Equipment Setup for Notch-Depth Measurements



- **Calibration**

- The combination of all cables and filters was calibrated, as a function of frequency, using the tracking generator in the spectrum analyzer
- Biconical antenna data is uncalibrated below 20 MHz

- **Device under test**

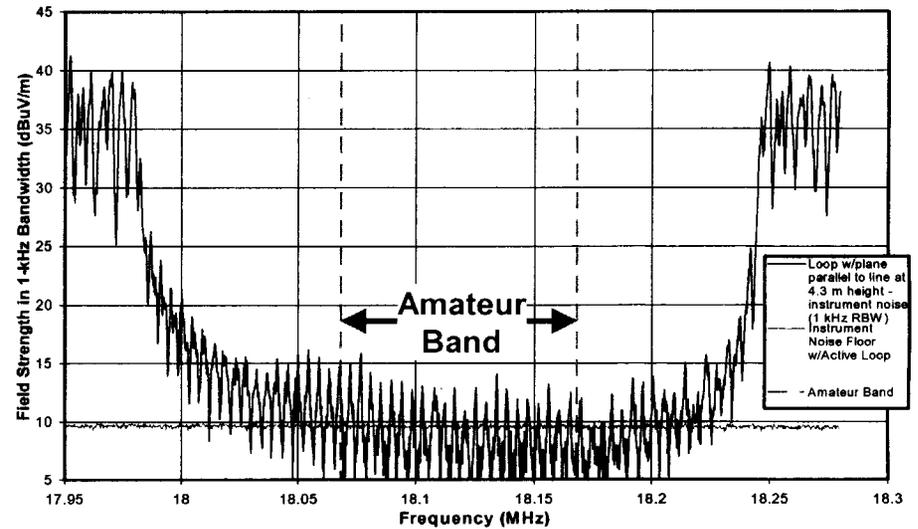
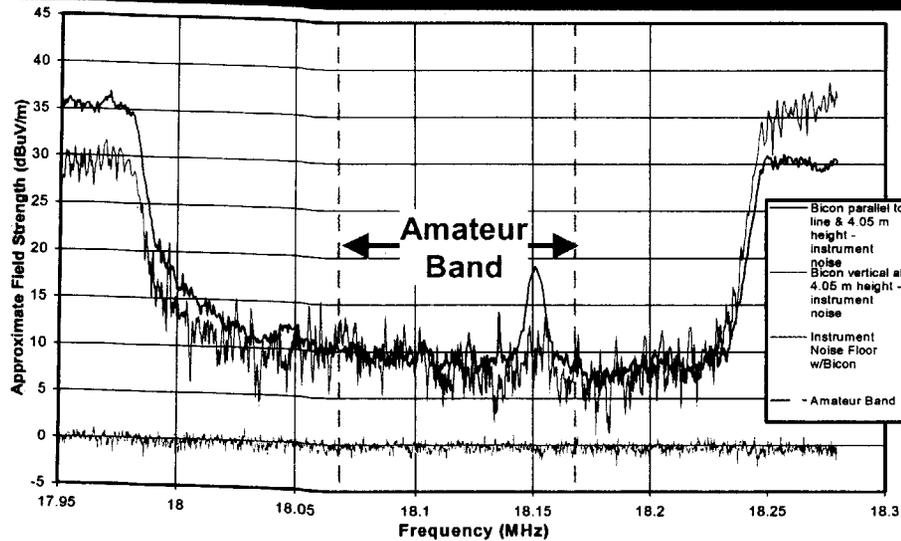
- Overhead Injector centered at 19.2 MHz at Holland Meadows

- **Measurement location**

- Antenna placed directly under power line, 7.7 meters down line (south) from BPL coupler
- Antenna height: 4.36 meters (active loop); 4.05 meters (biconical antenna)

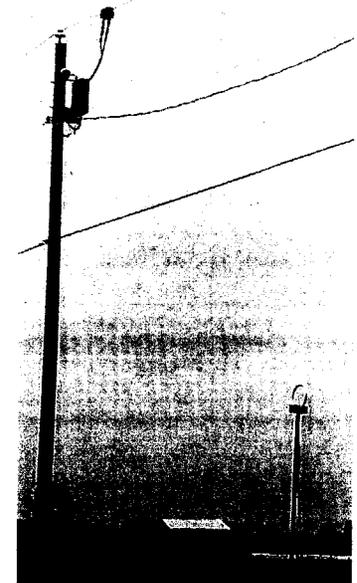
# Notch Depth

FCC Laboratory



- Notch depth of only unit with complete notch (19.2 MHz injector on Holland Church Rd) was measured in two ways
  - Evaluated spectrum band averages in two moderate-resolution (9 kHz) spectra from bicon antenna
  - Evaluated OFDM peaks in high resolution (1-kHz) spectra from loop antenna
  - Results ranged from 23.4 to 25.0 dB, with an average of 24 dB

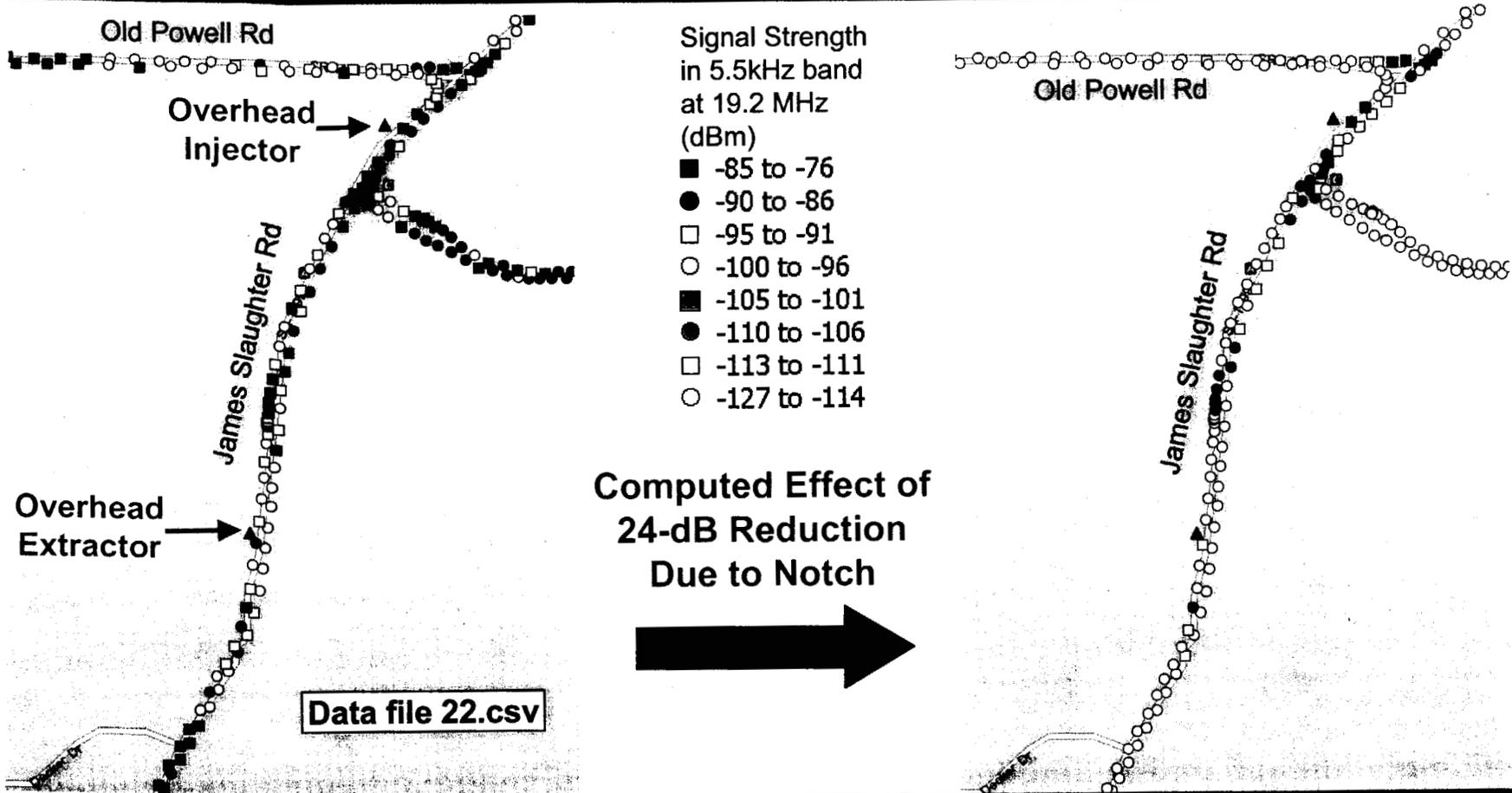
**Notch Depth is 24 dB**



# Predicted Effect of Notch

## Overhead Injector at Woodchase

FCC Laboratory

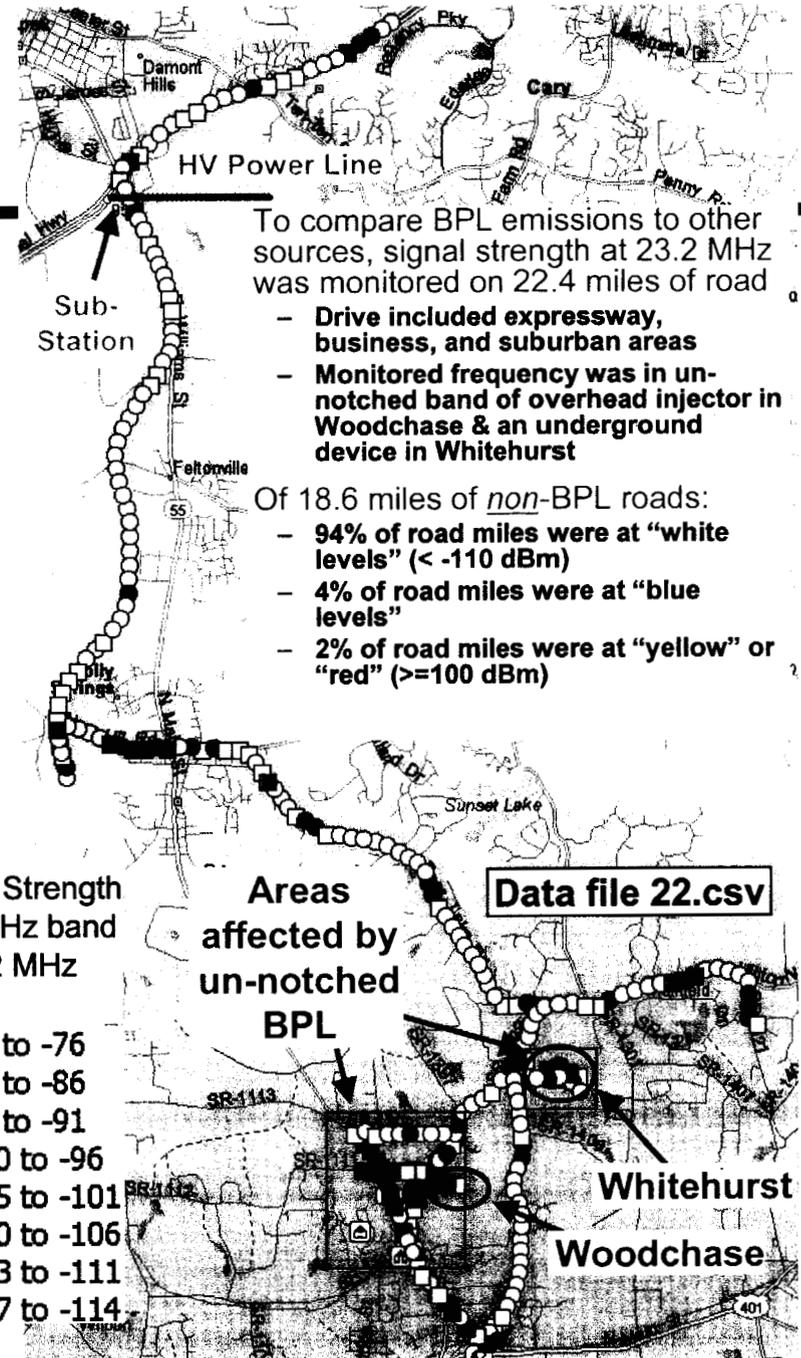
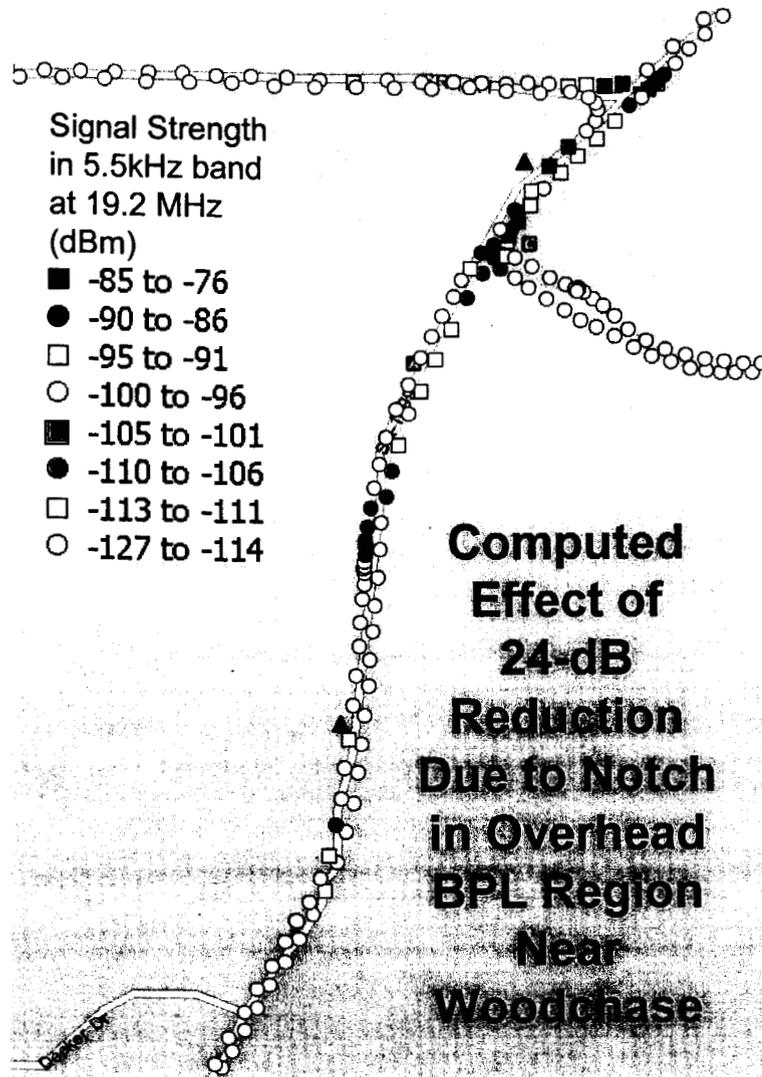


Highest emission from BPL is reduced to -100 dBm, 4-dB lower than the maximum seen in driving past the substation and 14 to 27 dB above ambient.

Interference distances are greatly reduced;  $\geq 110$  dBm (blue) occurs for only ~120 m of road

# Comparison of Notched BPL Signal Strength with Signal Strength in Non-BPL Regions

FCC Laboratory



To compare BPL emissions to other sources, signal strength at 23.2 MHz was monitored on 22.4 miles of road

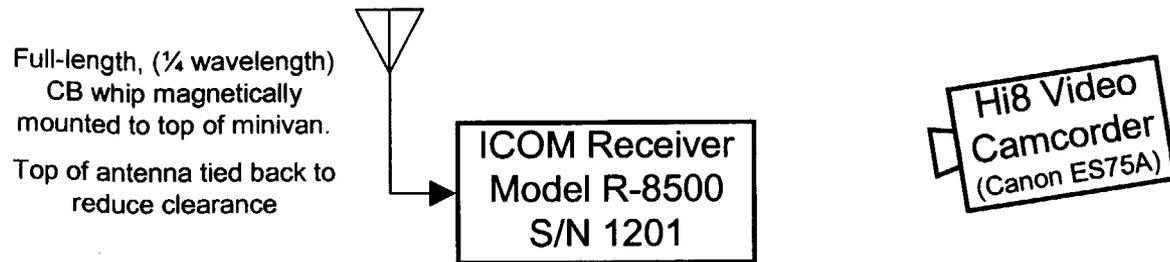
- Drive included expressway, business, and suburban areas
- Monitored frequency was in un-notched band of overhead injector in Woodchase & an underground device in Whitehurst

Of 18.6 miles of *non*-BPL roads:

- 94% of road miles were at "white levels" (< -110 dBm)
- 4% of road miles were at "blue levels"
- 2% of road miles were at "yellow" or "red" (>=100 dBm)

# Radio Tests of Notch Effectiveness

FCC Laboratory



- **Procedure**

- Receiver was manually tuned from the 15-meter amateur band through the 10-meter amateur band while recording sound and video of receiver
- Test was performed at two sites

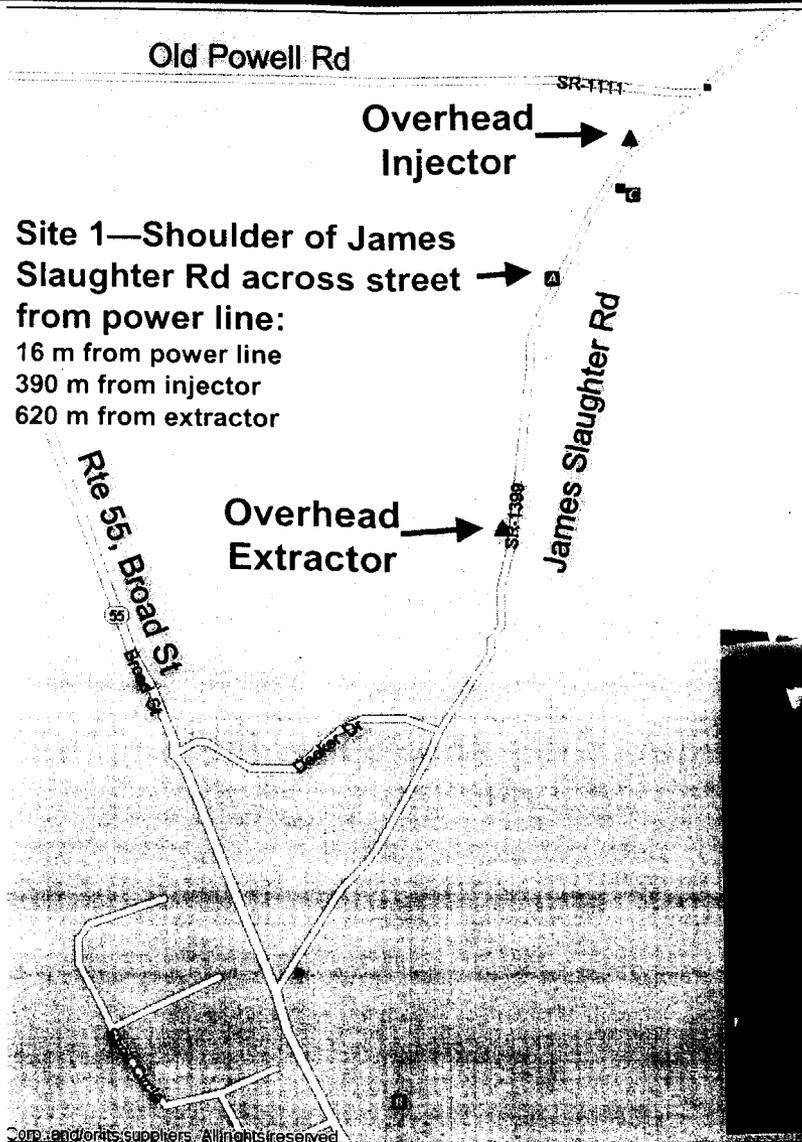
- **Receiver mode**

- AM with 5.5 kHz bandwidth
- SSB upper sideband with 2.2 kHz bandwidth

# Radio Tests of Notch Effectiveness

## Site 1 – Shoulder of James Slaughter Rd

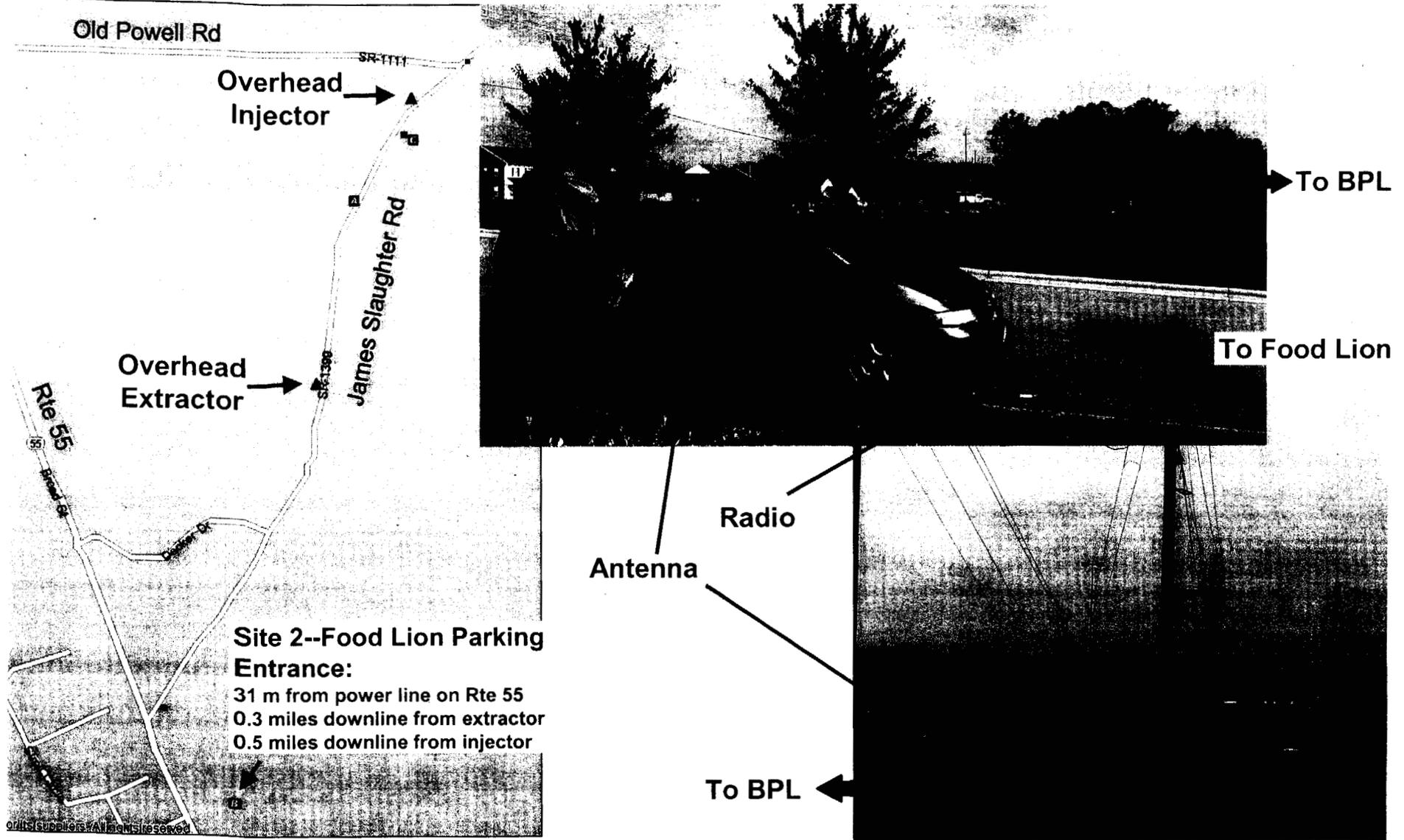
FCC Laboratory



# Radio Tests of Notch Effectiveness

## Site 2 – Food Lion Parking Entrance

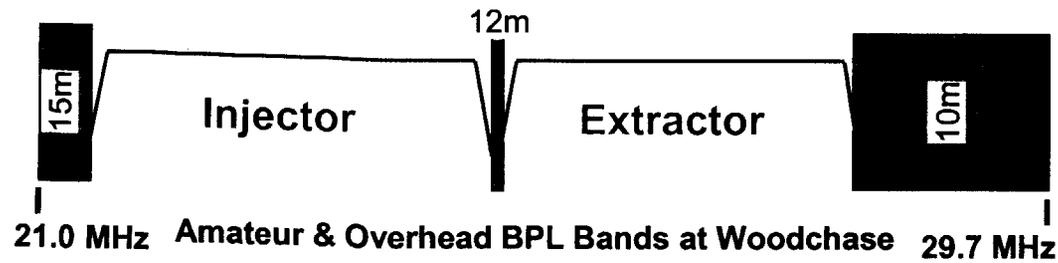
FCC Laboratory



# Effectiveness of BPL Notches

## Results

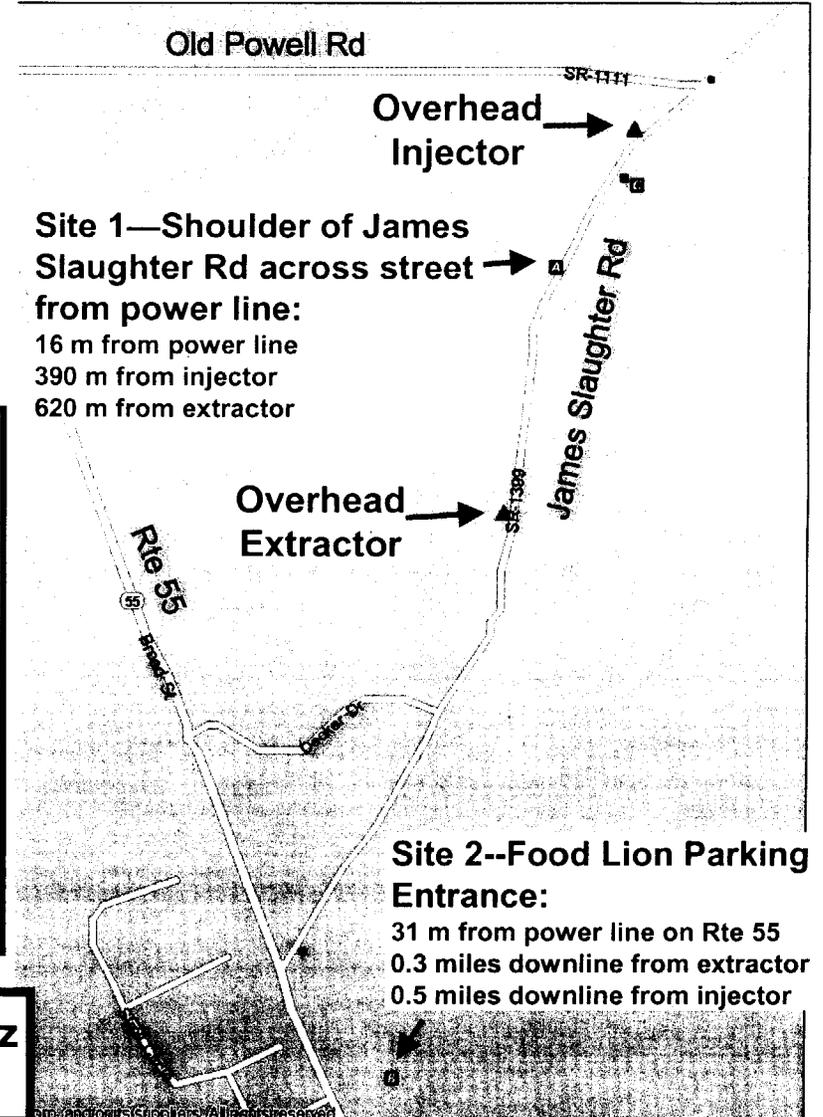
FCC Laboratory



Qualitative observations of BPL signal encroachment on amateur bands based on listening in SSB mode

Band	SITE 1 (Video files V-AM-S1 & V-SSB-S1)	SITE 2 (Video files V-AM-S2 & V-SSB-S2)
15 m	Moderate in upper 15kHz; Weak elsewhere	NONE
12 m	Moderate in lower half; Weak in upper half	NONE
10 m	Strong in lower 130kHz; Weak elsewhere	Moderate in lower 100kHz; Weak in next 30kHz; None elsewhere

**Recommendation: Increase notch width by 100 kHz at low end of 10m band (28 MHz)**

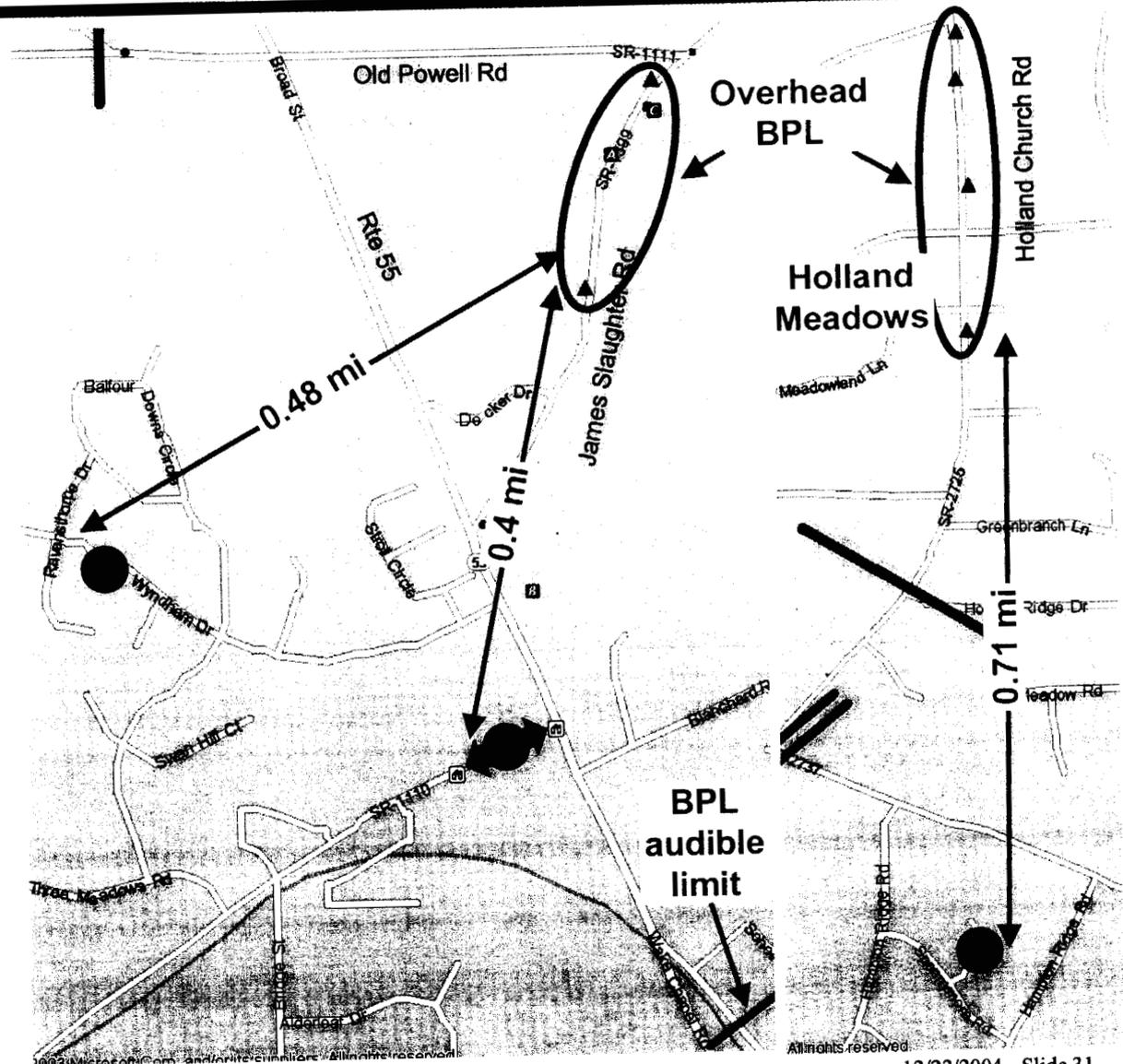


# Fixed Amateur Sites

# Fixed Amateurs

FCC Laboratory

- Fixed amateur locations included in complaint
  - ● 5813 Heathill Ct.
  - ● 509 Wyndham Dr
  - ● 201 Wilbon Rd 301B
- Interference not audible w/mobile antenna at ● & ●, even outside of notches
- ● not visited due to a mapping error. Location uncertain, but may be close enough to overhead lines on Rte 55 to detect un-notched BPL signals on mobile unit.
- No testing was performed with the fixed HF amateur antennas at any of the locations



**Ambient Westchester County, NY, Briarcliff**

- 3/31/04 Letter to Anh Wride et al. from E. Alan Crosswell  
Subject: Re: Harmful Interference from experimental license WD2XEQ  
Encl: Interference log for station N2YGK
- 4/26/04 E-mail to James Burtle from George Wheeler  
Subject: FW: Question re experimental license  
Related e-mail chain  
Attached: A letter to J. Burtle from G. Wheeler regarding the complaint of E. Alan Crosswell
- 6/11/04 Letter to Riley Hollingsworth from E. Alan Crosswell  
Re: Unresolved harmful interference from experimental license WD2XEQ  
Attached: Interference log for station N2YGK
- 9/10/04 E-mail to James Burtle from Bruce Franca  
Subject: FW: Briarcliff Manor Test  
Related e-mail chain
- 9/23, 27/04 E-mail to Bruce Franca et al. from Steve Martin  
Subject: FW: BPL in Briarcliff Manor  
Related e-mail chain
- 10/06/04 E-mail to Anh Wride et al. from Dave Hallidy  
Subject: Effectiveness of "Notching" BPL Signals In Amateur Radio/SWL Bands
- 10/07/04 E-mail to James Burtle from Alan Crosswell  
Subject: Re: Your BPL Complaint
- 10/07/04 E-mail to Bruce Franca et al. from Steve Martin  
Subject: Briarcliff Manor BPL—New Complaint  
Related e-mail chain
- 10/07/04 E-mail to Anh Wride et al. from [dgsvetan@rockwellcollins.com](mailto:dgsvetan@rockwellcollins.com)  
Subject: BPL Notching Effectiveness  
Related e-mail chain
- 10/07/04 E-mail to Ram Rao from Steve Martin  
Subject: Re: Response to you email  
Related email chain

**Bethlehem, PA      Amperion**

3/17/04      E-mail to Alan Stillwell et al. from James Burtle  
Subject: FW: Resolution of BPL Interference Complaint form Mr. Vincent

**BPL Penn Yan**

3/21/04      E-mail to rkelly@ssd.com from James Burtle  
Subject: Interference Compliant  
Related e-mail chain

4/21/04      **Penn Yan BPL Radio Interference Report**  
**Richard A. Ayers**  
**DVI Data Ventures Inc.**

4/21/04      E-mail to Alan Scrimme et al. from James Burtle  
Subject: FW: BPL Complaint  
Related e-mail chain

5/06/04      E-mail to James Burtle from Dave Hallidy  
Subject: Re: Complaint of Interference Lodged 3/28/04  
Related e-mail chain

5/10/04      E-mail to Dave Hallidy from FCCHAM  
Subject: Re: Interference Compliant  
Related e-mail chain

5/24/04      E-mail to James Burtle et al. from Dave Hallidy  
Subject: Second Complaint-BPL Interference in Penn Yan, NY  
With Attachment

6/6/04      E-mail to James Burtle form Jrpmccoy@aol.com  
Subject: Claims of BPL noise in Penn Yan and resolution.  
Related e-mail chain

6/18/04      E-mail to James Burtle form Jrpmccoy@aol.com  
Subject: Follow-up to BPL complaints in Penn Yan NY  
Related e-mail chain  
Attached: David Hallidy K2D report from Penn Yann

10/06/04      E-mail to Anh Wride et al. from Dave Hallidy  
Subject: Effectiveness of "Notching" BPL Signals In Amateur Radio/SWL  
Bands

**Progress Energy, Raleigh, Faquay Varina, N.C.**

- 3/11/04 E-mail to [ed.wallace@pgnmail.com](mailto:ed.wallace@pgnmail.com) et al. from James Burtle  
Subject: Interference complaints  
Related e-mail chain
- 3/11/04 E-mail to [bill.godwin@pgnmail.com](mailto:bill.godwin@pgnmail.com) et al. from Dick Orander  
Subject: BPL Interference Complaint
- 3/12/04 E-mail to Alan Stillwell et al. from James Burtle  
Subject: Progress Energy BPL Complaints  
Related e-mail chain
- 3/13/04 E-mail letter to Len Anthony from Gary Pearce  
Subject: Progress Energy BPL
- 3/29/04 E-mail to Bruce Franca et al. from Anh Wride  
Subject: FW: 2<sup>nd</sup> interference complaint regarding Progress Energy Phase II BPL  
Related e-mail chain
- 3/31/04 E-mail to Alan Scime et al. from James Burtle  
Subject: FW: Complaint: BPL Interference in N.Raleigh, NC  
Related e-mail chain
- 4/15/04 E-mail to Alan Stillwell et al. from James Burtle  
Subject: FW: Progress Energy Interference Complaints-who should these be directed to?
- 4/26/04 E-mail to Len Anthony et al. from Frank A. Lynch  
Subject: Re: Progress Energy Carolinas BPL Trial  
Related e-mail chain
- 4/28/04 E-mail to [flynch@nc.rr.com](mailto:flynch@nc.rr.com) from Ahn Wride  
Subject: Response to your email on BPL  
Related e-mail chain
- 5/5/04 E-mail to Alan Stillwell et al. from James Burtle  
Subject: FW: Interference Complaint Regarding your BPL System  
Related e-mail chain
- 5/11/04 E-mail to James Burtle et al. from Tom Brown  
Subject: RESEND-May 11, 2004- RE: Formal complaint-Progress Energy Part 15 devices

- 5/12/04 E-mail to Len Anthony from Gary Peace  
Subject: 3<sup>rd</sup> Interference Complaint regarding Progress Energy Phase II  
BPL Interference
- 5/14/04 E-mail to James Burtle et al. from Tom Brown  
Subject: RESEND – May 14, 2004 – Formal complaint – Progress Energy  
Part 15 devices  
Attachments: Previous complaints made to Progress Energy, the FCC, and  
a copy of Mr. Len Anthony's email
- 5/19/04 E-mail to [n4tab@earthlink.net](mailto:n4tab@earthlink.net) from Riley Hollingsworth  
Subject: Mr. Brown—my comments on your April 27 complaint & May  
11 follow-up  
Related email chain
- 5/21/04 E-mail to James Burtle et al. from Gary Pearce  
Subject: 4<sup>th</sup> Interference Complaint regarding Progress Energy Phase II  
BPL Interference
- 6/10/04 E-mail to James Burtle et al. from Tom Brown  
Subject: Re: 8<sup>th</sup> RESEND – June 2, 2004 – Progress Energy Part 15  
devices  
Related e-mail chains
- 9/29/04 E-mail to James Burtle et al. from Tom Brown  
Subject: Reply and additional complaint – Progress Energy BPL systems –  
Wake County, NC  
Attached: Reply and additional complaints
- 10/5/04 E-mail to Sheryl Wilkerson et al. from Gary Pearce  
Subject: "Notching" BPL signals on Amateur Radio/SWL Bands  
Related e-mail chain

### Cape Girardeau

- 8/14/03 **Product Safety Engineering, INC. Test Report**  
**Main.net Power Line Communications Inc.**
- 9/8/04 Letter to David Solomon et al. from Christopher Imlay  
Subject: Experimental Station WC2XXX

**Manassas, VA**

- 3/24/04      **Report of Harmful Interference From a Broadband Over Power Line  
Trial or Deployment**  
Donald W. Blasdel
- 4/15/04      Letter to James Burtle from Allen P. Todd  
Subject: Radio Interference caused by BPL deployment in Manassas

**Alliant Cedar Rapids, IA**

- 4/5/04      E-mail to Alan Stillwell et al. from Jim Spencer  
Subject: Fw: Noise Status-March 2004  
Related e-mail chain
- 4/22/04      E-mail to Tim VanWeelden from Jim Spencer  
Subject: Harmful Interference from BPL
- 5/10/04      Letter to Tim VanWeelden from Richard L. Sellers  
Subject: BPL Test Installation in Cedar Rapids  
Related Letters and e-mail chains
- 5/17/04      E-mail to Alan Stillwell fro Rick Sellers  
Subject: BPL Interference in Cedar Rapids, Iowa  
Attached: Letter to Tim VanWeelden
- 5/17/04      E-mail to James Burtle et al. from Jim Spencer  
Subject: Response Requested
- 5/27/04      Letter to Tim VanWeelden from Robert Hirvela  
Subject: BPL Complaint
- 5/27/04      E-mail to Anh Wride et al. from Arlo W Meyer  
Subject: Fw: BPL
- 6/1/04      E-mail to [timvanweelden@alliantenergy.com](mailto:timvanweelden@alliantenergy.com) from James Burtle  
Subject: PBL Interfernce complaints  
Related e-mail chain
- 6/4/04      E-mail to Anh Wride et al. from Steve Martin  
Subject: Re: ATTENTION: ACTION REQUESTED  
Related e-mail chain
- 6/15/04      Letter to Jim Burtle from Daniel Hinz  
Attached: Report

**6/18/04 Cedar Rapids, Iowa, BPL Trial System Radio Frequency Interference Tests Report  
Cedar Rapids BPL Steering Committee  
Dale G. Svetanoff**

10/7/04 E-mail to Anh Wride et al. from [dgsvetan@rockwellcollins.com](mailto:dgsvetan@rockwellcollins.com)  
Subject: BPL Notching Effectiveness

10/14/04 E-mail to James Burtle from Jim Spencer  
Subject: Re: BPL Notching—Actual Experience  
Related e-mail chain

**Cottonwood, AZ**

5/19/04 Report of Harmful Interference from a Broadband Over Power Line Trial or Deployment  
Tom Schrum  
Comment on 04-37

6/16/04 E-mail to Anh Wride et al. from Ernie & Betsy Cummings  
Subject: Interference from Broadband Over Power Line Transmission  
Attached: BPL Trial complaint from Floyd E. Cummings (Ernie)  
Related e-mail chain

6/17/04 Letter to James Burtle from Clinton Pierce  
Subject: Complaint against interference Amateur Hams Bands from Broadband Power Line System  
Attached: BPL Trial complaint from Clinton L. Pierce and Data sheets  
Related e-mail chain

6/17/04 Letter to James Burtle from Robert B. Thompson  
Subject: Interference in Cottonwood  
Attached: Data sheets

6/18/04 E-mail to James Burtle from Ernie & Betsy Cummings  
Subject: Interference from Broadband Over Power Line Transmission  
Attached: BPL Trial complaint from Floyd E. Cummings (Ernie)  
Related e-mail chain

6/21/04 Report of Harmful Interference from a Broadband Over Power Line Trial or Deployment  
Gregory A. Allen  
Attached: Data sheets

- 7/12/04 Report of Harmful Interference from a Broadband Over Power Line Trial or Deployment  
David Kiggins CBT
- 7/31/04 Letter to Arizona Public Service (Customer Service) from Mike Kinney  
Subject: Interference issues of the two BPL tests sites located in Cottonwood, AZ, to Amateur Radio communication  
Attached: Cottonwood, AZ BPL Trial System Radio Frequency Interference Report
- 8/5/04 E-mail to James Burtle from Steven Pearson  
Subject: FW: bpl complaint  
Attached: Letters and Data sheets  
Related e-mail chain
- 8/14/05 E-mail to Anh Wride et al. from Rod Rosenbarger  
Subject: Interference  
Attached: BPL Trial complaint from Rodney W. Rosenbarger and a report on Advanced Refractive Effects Prediction System
- 8/25/04 E-mail to James Burtle from Richard Fusinski  
Subject: BPL Interference
- 9/2/04 E-mail to James Burtle et al from Anh Wride  
Subject: FW: BPL Interference complaint, new  
Related e-mail chain
- 9/21/04 E-mail to [shpigler@electricbroadband.com](mailto:shpigler@electricbroadband.com) from James Burtle  
Subject: FW: BPL Interference Reports  
Attached: Letters, Data sheets, and a Report of Harmful Interference from BPL dated 8-9-04
- 10/6/04 E-mail to Sheryl Wilkerson from Robert Shipton  
Subject: Verde valley Amateur Radio Association, Cottonwood, AZ BPL Notching summary  
Attached: Committee Report and BPL Signal Strength Readings
- 10/7/04 E-mail to James Burtle from [jimc100@juno.com](mailto:jimc100@juno.com)  
Subject: Re: Your BPL Complaint  
Related e-mail chain
- 10/7/04 E-mail to Anh Wride et al from [kit@ka0wuc.org](mailto:kit@ka0wuc.org)  
Subject: BPL comments  
Attached: PDF file containing a series of measurements from a BPL system in service near Cottonwood Arizona.

10/11/04

Letter to James Burtle et al. from Christopher Imlay  
Subject: Experimental Station WB9XVP at Cottonwood  
Attached: Document with data

E. Alan Crosswell  
Amateur Radio Station N2YGK  
144 Washburn Road  
Briarcliff Manor, NY 10510  
212-854-3754  
n2ygk@weca.org

March 31, 2004

Anh Wride  
Federal Communications Commission  
Office of Engineering and Technology  
Room 7-A825 Portals II  
445 12th Street SW  
Washington, DC 20024  
Awride@fcc.gov

Alan R. Stillwell  
Federal Communications Commission  
Room 7-C210  
445 12th Street SW  
Washington, DC 20024  
Astillwe@fcc.gov

Riley Hollingsworth  
Federal Communications Commission  
1270 Fairfield Road  
Gettysburg, PA 17325  
Rholling@fcc.gov

James R. Burtle  
Federal Communications Commission  
Chief, Experimental Licensing Branch  
Room 7-A267  
445 12th Street SW  
Washington, DC 20024  
jburtle@fcc.gov

Re: Harmful interference from experimental license WD2XEQ (File No. 0050-EX-ML-2003)

Dear FCC staff:

I believe with some certainty that recent interference to FCC licensed radio operation that I have experienced is caused by the Ambient Corporation field trial using Con Edison's medium voltage electrical transmission facilities operating under FCC Special Temporary Authorization with callsign WD2XEQ (File No. 0050-EX-ML-2003) in and around Briarcliff Manor, NY where I reside. The experimental power line communications system appears to be interfering with the operation of my licensed station in the 14 MHz band. Per the terms of Special Condition (1) of the Commission's Special Temporary Authorization, I ask that you have Con Edison immediately cease operation of this system until such time as the interference is resolved as they are interfering with a primary licensee of the frequency band in question.

I will be glad to work with you to demonstrate that the recurring interference I have detected is in fact caused by Con Ed's system. A simple "on-off" test of their PLC system should demonstrate whether it is the root cause as the

interference is fairly continuous in nature. Please contact me if you wish to do so and I will make myself and my station available.

Attached find my log describing the recent dates, times, frequencies, and description of the interference I have experienced, including one case where my communication with an international station was harmfully interfered with.

Today I have sent a similar letter to Con Edison Customer Communications, 511 Theodore Fremd Ave, Rye, NY 10580 with copy to Dr. Yehuda Cern of Ambient Corporation, the STA licensee, and Counsel for Ambient Corporation.

I look forward to immediate cessation of this harmful interference.

Sincerely,

E. Alan Crosswell

encl: Interference log for station N2YGK

Station N2YGK interference log  
-----

3/27/04 10:00

[Taking Sarah home from basketball at Claremont via Pleastanville Rd.]  
Monitoring 14.212 heard interference while driving from Pleasantville Rd south of Old Briarcliff Rd, along Poplar and Dalmeny to Pine Rd. Interference was strongest about midway along Dalmeny. Sounded like an intermittent raspy square wave of about 1-2s duration preceded by 1 or 2 short bursts. Obviously not a lot of traffic currently being sent as there were fairly long silent periods of 5-10 seconds in between. If this had more than a single customer on it, the traffic would be more near continuous I imagine. The noise was an S9 at max using an FT-840 with a Hamstick 9120 vertical mounted to the rear bumper of my Chevy Suburban and it wiped out LY9Y calling CQ during CQ WPX contest. I normally get about an S4 noise level from the vehicle but was able to hear LY9Y calling quite clearly over it.

If I hadn't known there was a BPL trial along this route I would have had difficulty locating the interference as it is pretty much continuous along the entire route.

-----  
3/27/04 11:35

[Returning from dropping Sarah at Ossining Pizza via Pleasantville Rd.]  
Took photos at 178 Dalmeny. Interference as described previously was read S9+20 at 14.217. Driving around the area (Pleasantville Rd North to Chappaqua Rd) heard S9+20 on 14.233. Took a photo of the traffic cam that I think is also connected to the BPL system.

-----  
3/27/04 15:10

[Returning from trip to supermarket and Citibank on Pleasantville Rd.]  
While working DL00V in CQ WPX contest was forced to ask him to repeat his exchange when a burst of BPL clobbered his transmission. His RST 59 in between the BPL noise. (Exchange was his 59 #832 my 59 #005)  
This was on Pleasantville Rd south just north of the intersection with Poplar.

-----  
3/28/04 07:29

[Driving to Briarcliff Bagels on North State Rd via Washburn to Carlton to Rt 9A North to North State.] BPL QRM on 14.294 from North State and Rt 9A and north on North State to Chappaqua Rd. Worked NN4N and NMSO in CQ WPX.

-----  
3/28/04 07:39

[Returning from Briarcliff Bagels.] QRM on 14.213 on Chappaqua Road between North State and Carlton. Drops off at Carlton where I turned right. This stretch of Carlton has underground power lines. Worked K5TR in CQ WPX.

-----  
3/28/04 20:01

[Going to Chelsea's to pick up Rachel.] QRM on 14.162 starting at Carlton and 9A and continuing up 9A to left on North State and right on Pleasantville Rd north through Orchard Rd in Ossining. Heard most strongly along Pleasantville Rd between North State and Mulberry Rd, where it completely covered a QSO I was trying to monitor.

-----  
3/30/04 17:00

Contacted Con Ed customer service to file an interference complaint. I gave the location of the interference as in the vicinity of Pleasantville Rd and Poplar Rd and up to Old Briarcliff Rd. The customer service agent said he would open a trouble ticket and took my name and daytime phone number. I asked for and was given a postal address to send a written complaint.

**James Burtie**

---

**From:** george.wheeler@hklaw.com  
**Sent:** Monday, April 26, 2004 4:17 PM  
**To:** James Burtie  
**Subject:** FW: Question re experimental license

*Burtie*



Ambient Letter  
Response to FCC...

Jim ... The hard copy should already be at the Secretary's office ... George

-----Original Message-----

**From:** Wheeler, George (WAS - X77073)  
**Sent:** Monday, April 26, 2004 12:35 PM  
**To:** 'James.Burtie@fcc.gov'  
**Subject:** FW: Question re experimental license

Jim ... Attached is an electronic copy of the response of Ambient to your inquiry regarding the complaint filed by R. Alan Crosswell. The original hard copy version is being filed in the Secretary's office. Please call or email me if you would have any questions regarding this matter. Thanks for your help. George

George Y. Wheeler  
Holland & Knight LLP  
2099 Pennsylvania Avenue, NW, Suite 100  
Washington, DC 20006-6801  
202 457-7073 \* FAX 202 955-5564

**From:** James Burtie [mailto:James.Burtie@fcc.gov]  
**Sent:** Thursday, April 01, 2004 11:21 AM  
**To:** John J. Joyce  
**Cc:** Alan Stillwell; Alan Scrimme; Bruce Franca; Bruce Romano; Anh Wride; Ira Keltz  
**Subject:** Question re experimental license

Mr. Joyce,  
My name is Jim Burtie. I am Chief of the Experimental License Branch in the Office of Engineering and Technology at the FCC. I have recently received an interference complaint related to the operation of your BPL system.  
From our records it appears that your experimental license has expired and you have not applied for a renewal. Are you now operating under Part 15? Your answer will assist me in determining how to handle the interference complaint. Thank you for your time,  
Jim Burtie