Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 15 Regarding New Requirements	)	ET Docket No. 04-37
and Measurement Guidelines for Access	)	
Broadband over Power Line Systems	)	

To: The Federal Communications Commission

COMMENTS OF THE AMERICAN PETROLEUM INSTITUTE

THE AMERICAN PETROLEUM INSTITUTE

Wayne V. Black
Nicole B. Donath
Its Attorneys

Randall D. Young
Telecommunications Engineer

Keller and Heckman LLP
1001 G Street, Suite 500 West
Washington, D.C. 20001
(202) 434-4100

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SUMMARY

Member companies of the American Petroleum Institute ("API") utilize licensed land mobile radio systems in the bands below 150 MHz both to support their day-to-day operations and to respond to oil spills and other emergency situations. As such, the continued operation of these systems -- free from harmful interference -- is essential to protecting lives, health, property and the natural environment. API has serious concerns about the potential for harmful interference to these vital land mobile operations from Broadband over Power Line ("BPL") devices. These interference concerns are echoed and verified by the National Telecommunications and Information Administration ("NTIA"), which recently conducted an extensive technical study regarding the potential interference effects of BPL.

While API generally supports the measures proposed by the Federal Communications Commission ("FCC" or "Commission") in order to prevent and/or mitigate interference from BPL (*e.g.*, the implementation of adaptive interference avoidance technologies and a shut-down feature), API does not believe that the Commission's current proposals are sufficient to protect licensed services. Even a cognitive technology approach, whereby the BPL equipment would be expected to dynamically avoid any interfering transmissions, is likely to fail in some cases because such devices are unable to detect the presence of passive radio receivers listening for traffic.

To fully and adequately protect licensed systems, the Commission would need to require that BPL devices permanently avoid operations on entire frequency bands where licensed emissions are detected. At the very least, the Commission should require that BPL devices avoid operating on channels and in bands that are specifically designated for safety-related operations, such as the oil spill containment and cleanup channels operated by API member companies. API

also recommends that the Commission: (1) impose more stringent emission measurement requirements upon BPL operators, including a requirement to test every installed BPL device *in situ* throughout the entire spectrum being employed and along the field(s) surrounding the potential radiating elements; and (2) adopt priority interference resolution procedures for public safety and critical infrastructure operations -- subject to strict FCC enforcement -- whereby BPL operators must, among other things, immediately shut down their operations upon a licensee's report of interference.

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The American Petroleum Institute ("API"), by its attorneys, is pleased to submit these Comments to the Federal Communications Commission ("FCC" or "Commission") in response to the Notice of Proposed Rule Making ("NPRM") [1] released on February 23, 2004 that looks toward the adoption of new rules regarding Access Broadband over Power Line ("BPL") systems. As further discussed herein, API urges the Commission to ensure that BPL operations do not create an unacceptable risk of harmful interference to private land mobile operations in the bands below 150 MHz, including important critical infrastructure operations such as those of petroleum industry licensees.

I. PRELIMINARY STATEMENT

1. API is a national trade association representing approximately 400 companies involved in all phases of the petroleum and natural gas industries, including the exploration, production, refining, marketing and transportation of petroleum, petroleum products and natural

[1] 69 Fed. Reg. 12612 (Mar. 17, 2004).

gas. The API Telecommunications Committee is one of the standing committees of the organization's General Committee on Information Management & Technology. The Telecommunications Committee evaluates and develops responses to state and federal proposals affecting telecommunications facilities used in the petroleum and natural gas industries.

2. API's Telecommunications Committee is supported and sustained by companies that are authorized by the Commission to operate telecommunications systems in various of the licensed radio services, including extensive operations in the Private Land Mobile Radio Services ("PLMRS"), governed by Part 90 of the Commission's Rules. These PLMRS systems are used to support the search for and production of oil and natural gas, to ensure the safe pipeline transmission of natural gas, crude oil and refined petroleum products, to process and refine these energy sources and to facilitate their ultimate delivery to industrial, commercial and residential customers. A number of these PLMRS systems operate in the bands below 150 MHz, many utilizing channels in the 25-50 MHz band, some of which are dedicated primarily for oil spill containment and cleanup operations and related drills and training.[2]

3. Because BPL systems also operate in the spectrum below 150 MHz, over a wide range of frequencies, the HF and "low-band" PLMRS systems of API member companies and other licensees are potentially subject to interference from BPL operations. The continued operation of the private radio systems employed by petroleum and natural gas companies is absolutely essential to protecting lives, health and property, both in support of the day-to-day operations of these companies, as well as during responses to oil spills and other emergency incidents. These systems are integral to the provision of our nation's energy resources to the public. Due to concerns about the potential impact of BPL operations on theses systems, API

[2] See 47 C.F.R. §§ 90.35(c)(8) and 90.35(c)(15).

submits the Comments below.

II. COMMENTS

4. The Commission seeks comment in its NPRM on new requirements and measurement guidelines for BPL systems. While API agrees with the Commission that the implementation of BPL systems may offer substantial public and private benefits, API also believes that BPL operations -- under the terms and conditions contemplated in the NPRM -- may cause harmful interference to private land mobile operations, including those of public safety and critical infrastructure industry licensees. As discussed below, API recommends that the Commission consider precluding BPL operations on oil spill channels and other frequencies designated for important safety functions. API also urges the Commission to impose more rigid BPL emissions measurement requirements and to adopt stringent procedures for ensuring that any interference cases are promptly identified and resolved.

A. BPL Systems Pose a Substantial Risk of Interference to Critical Infrastructure Industry Land Mobile Operations

5. The Commission correctly notes in its NPRM that the frequencies typically used by BPL systems "are also used by licensed radio services that must be protected from harmful interference as BPL systems operate on an unlicensed basis under Part 15 of the Commission's rules." (NPRM at ¶ 5). These licensed radio services include critical infrastructure industry systems, such as those that are operated by petroleum companies and that -- like the traditional "public safety" systems discussed in the NPRM -- serve important safety-related functions.

6. While API applauds the Commission's recognition of the need to protect licensed services, API questions the Commission's conclusion that "a properly designed and operated BPL system will pose little interference hazard to non-amateur services such as aeronautical,

maritime and public safety." (NPRM at ¶ 37). In this regard, the Commission seems to assume that public safety systems (and, presumably, other types of land mobile systems) are less susceptible to interference from BPL than are amateur radio systems because public safety systems typically are designed to "receive a signal level significantly above the noise floor," while amateur systems use "high-sensitivity receivers to receive signals from transmitters often thousands of miles away." (*Id.*). It is API's understanding, however, that with regard to land mobile systems (including public safety) and amateur radio systems *operating in similar portions of the spectrum*, the design and installation of these systems are virtually identical.[3] Further, in light of the widespread presence of power lines throughout our nation, the proximity of each type of station (*i.e.*, land mobile and amateur) to power lines in the area should be fairly comparable. Under such circumstances, the potential risk of interference from BPL to each type of station would be expected to be similar.

7. API also believes that the Commission may have improperly discounted the potential cumulative interference effects of multiple BPL devices transmitting simultaneously in the same geographic area. (See NPRM at ¶ 36). Particularly given the Commission's recent analyses and discussions with regard to the "interference temperature" approach to measuring and managing interference,[4] the agency should recognize that the operation of multiple BPL devices is likely to create at least some aggregate or cumulative radiating effects that may enhance the potential for harmful interference to licensed systems.

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[3] For instance, a PLMRS station operating on 49 MHz with a vertical whip is analogous to an amateur station operating on 50 MHz in a similar installation. Further, contrary to the Commission's assertions, API believes that *low-band* critical infrastructure and public safety systems do not necessarily operate well above the noise floor, particularly in the case of mobile units operating near the fringe of the licensee's service area.

[4] See In the Matter of Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands, *Notice of Inquiry and Notice of Proposed Rulemaking*, ET Docket No. 03-237 (2003).

8. An extensive technical report recently released by the National Telecommunications and Information Administration ("NTIA") verifies that BPL operations pose a real risk of interference to HF land mobile operations.[5] In particular, the NTIA Study concludes that:

> [A] vehicle-mounted HF receiver operating in a residential environment on a roadway adjacent to a BPL-energized power line may experience harmful interference, depending upon the frequency, the distance along the line away from the BPL transmitter, the BPL transmitter duty cycle and the number of BPL devices on the line.[6]

The Study also concludes that, under certain circumstances, a majority of the areas in a road along the power line could be subject to at least a ten-fold increase in total receiver noise power and that a land-mobile receiver could experience interference "out to distances on the order of 120 meters from the power line."[7]

9. Finally, API notes that at least one API member company already has experienced interference from a sub-50 MHz service operating in Alaska over a power distribution system. This member company reports that, due to interfering radiation, operations have been impeded on its low-band radios within 200 yards of the distribution line; the company also has experienced a loss of functionality with respect to its HF radios that are used for emergency communications.[8] In view of the potentially devastating consequences of harmful interference to

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[5] Potential Interference From Broadband Over Power Line (BPL) Systems to Federal Government Radiocommunications at 1.7-80 MHz, Phase 1 Study, Volume I, National Telecommunications and Information Administration (April 2004) (hereinafter "NTIA Study"). API urges the Commission to include the NTIA Study and related documents prepared by the NTIA in the official record of this proceeding and to treat them accordingly.

[6] NTIA Study at 6-12.

[7] *Id*. at 6-11 and 6-12.

[8] The company that experienced the interference has been unable to obtain any information from the power company that was involved as to the precise type of operations that were causing the interference -- *i.e.*, BPL versus Power Line Carrier ("PLC"). However, based upon the signal, bandwidth and strength code detected by the petroleum company, the company believes that the source of the interference was a Part 15 BPL test in a remote environment.

public safety and critical infrastructure systems, API urges the Commission to proceed with the utmost caution in this matter and to adopt additional safeguards recommended by API and others in order to prevent interference from BPL systems and minimize the potential impact of any interference that does occur. API also encourages the Commission (like the NTIA) to conduct its own field studies in order to further verify the interference potential of BPL.[9]

B. Implementation of the Interference Avoidance and Mitigation Technologies Proposed by the Commission May be Insufficient to Protect Licensed Services

10. API generally supports the Commission's proposals to require BPL systems and devices to incorporate certain adaptive interference avoidance technologies (such as power reduction and frequency selection capabilities), as well as a shut-down feature and notification requirement. (See NPRM at ¶¶ 40-43). However, for a number of reasons, API is concerned that such requirements will not be sufficient to prevent and mitigate actual interference.

11. With respect to any technical interference avoidance measures contemplated by the Commission that would need to be implemented manually by a BPL system operator, a number of potential pitfalls arise. Most notably, although the BPL operator may be able to identify and select a "clear channel" (or range of channels) upon initiating operations, interference could nonetheless occur in instances where a licensee subsequently attempts to

[9] While these comments focus upon the potential for interference by BPL to HF land mobile operations, API also is concerned about the possibility of interference in other areas of the spectrum that are operated or relied upon by API member companies. For instance, there reportedly is at least one manufacturer that has designed BPL equipment for use in the microwave spectrum bands. API believes that such BPL operations should be permitted only: (1) in portions of the microwave spectrum where licensed terrestrial stations -- particularly public safety and critical infrastructure operations -- are not highly prevalent; (2) in situations where BPL propagation is minimal and the BPL radiation loses strength rapidly through space; and (3) where adaptive interference mitigation techniques can effectively be employed to avoid interference. API also recommends that BPL not be permitted to operate in the medium wave (MW) AM broadcast band, as API member companies (and presumably many others) utilize AM broadcast receivers in their vehicles -- often in remote and fringe locations -- in order to maintain the capability to receive emergency alerts from the Emergency Alert System. Further, API urges the Commission to address the possibility that, unless BPL devices employ adequate filtering, harmonics and spurious emissions could extend beyond the spectrum occupied by BPL, potentially resulting in intermodulation interference to VHF operations and other licensed bands.

transmit or receive signals on that channel. Efforts to promptly resolve that interference could then be complicated by factors such as the following: (1) the licensee receiving interference may not be aware of the interference, even where present at a sufficient strength to completely block communications, such as in the case of a public safety or critical infrastructure system receiving data transmissions over a muted receiver; (2) the licensee receiving interference may not immediately be able to identify the source of the interference, a process which typically requires an on-site investigation by experienced technicians with specialized test equipment; (3) current and accurate contact information for the BPL provider may not be available to the party receiving interference; and (4) the BPL provider may not have adequate personnel available on a "24/7" basis in order to implement interference avoidance or mitigation capabilities.

12. Moreover, API questions the likely effectiveness even of a cognitive technology approach, whereby the BPL equipment would be expected to detect emissions from licensed incumbents and dynamically avoid any interfering transmissions. Such an approach is likely to fail in some instances for the simple reason that no existing cognitive radio device is able to detect (on a frequency-specific basis) the presence of passive radio receivers listening for traffic, and such devices also may be unable to detect weak incoming signals at nearby receivers. As a result, a BPL device employing such cognitive technology could interrupt in-progress communications over a nearby receiver or prevent subsequently transmitted communications from being received. In order to fully protect licensed operations and prevent interference to important safety-related communications, cognitive BPL devices would need to permanently avoid operations on entire frequency bands where licensed emissions are detected.

13. At a minimum, the Commission should consider requiring that BPL devices avoid operating on channels and in bands that are specifically designated for safety-related operations.

The NTIA notes in its report that "[b]oth NTIA and FCC have long recognized that certain frequencies or bands in the radio spectrum require special protection from interference because of the critical or sensitive functions they support, including distress and safety, radio astronomy, radionavigation, and others."[10] Accordingly, the NTIA proposes a "candidate list" of 41 Federal Government frequencies in the bands between 1.7 MHz and 80 MHz that it believes may be entitled to special protection from BPL systems due to the vital nature of the operations on those frequencies.[11] API strongly urges the Commission to include the private land mobile oil spill containment and cleanup frequencies below 150 MHz among any "critical or sensitive" frequencies that it ultimately decides warrant special protection from BPL.[12]

14. In addition to the interference avoidance measures discussed above, the Commission proposes, in its NPRM, to require that BPL devices incorporate a shut-down feature that would deactivate units found to be causing harmful interference. (NPRM at ¶ 42). API supports such a requirement and urges the Commission to specify in its rules that BPL providers must implement the shut-down feature upon receiving a report of interference from a valid FCC licensee. In other words, the BPL provider should not be able to first investigate and confirm the interference before implementing shut-down capabilities, as such a potentially lengthy delay in shut-down could exacerbate the negative consequences of the interference. API also supports the Commission's proposal to subject BPL systems to a notification requirement, whereby BPL system operators would submit information on their systems to an industry-operated entity. (NPRM at ¶ 43). Like the shut-down feature, however, such a measure will only be helpful in

[10] NTIA Study at 9-2.

[11] *Id*. at 4-8 and Table 4-9.

[12] These frequencies include the following: 25.04 MHz, 25.08 MHz, 36.25 MHz and 41.71 MHz. See 47 C.F.R. §§ 90.35(c)(8) and 90.35(c)(15).

remedying interference "after the fact," rather than in preventing incidents of interference from occurring.

15. As a more general matter, API is concerned that -- on a going forward basis -- BPL proponents will seek to operate on greater amounts of bandwidth and at increasingly higher power levels, thereby making it virtually impossible or impractical to protect all licensed and/or pre-existing radio services that may be subject to interference therefrom. In the face of such potential mounting pressure to expand BPL, API urges the Commission to remain vigilant in its position that licensed radio services must be protected, even if such protection makes it necessary to limit or curtail the growth and/or capabilities of BPL.

C. BPL Operators Should be Subject to More Stringent Procedures for Measuring Emissions

16. As discussed above, adoption of the proposals in the NPRM may serve to reduce or mitigate interference, but a real possibility of harmful interference to licensed private land mobile systems would still remain. One way to further reduce the likelihood of interference to important public safety and critical infrastructure industry systems is to impose more stringent and technically sound procedures for measuring BPL emissions.

17. The Commission proposes that BPL systems be measured for compliance *in-situ* at a minimum of three underground and three overhead locations. (NPRM at ¶ 45 and Appendix C). While API agrees that compliance measurements should be made *in-situ*, API strongly disagrees with the contemplated use of representative locations. Because each BPL field installation will be unique in some fashion (whether due to the precise physical geometry of the infrastructure or to characteristics of the surrounding environment), API urges the Commission to mandate that every installed BPL device be tested *in-situ* for compliance with the

Commission's Part 15 requirements. Such an approach is consistent with the Commission's existing rules governing site-specific compliance for licensed services; although BPL will not be a licensed service, the risk of site-specific conditions that might result in non-compliance (and, hence, interference) is substantial enough to warrant site-specific measurements.

18. API also believes that these compliance measurements should be made continuously throughout the spectrum being employed (rather than only at mid-band frequencies)[13] and along the field(s) surrounding the potential radiating elements. In particular, API recommends that the Commission mandate the specific design and physical dimensions of the antennas and feedlines to be used during measurements, and a standard graph should be created depicting the gain behavior (in free space) of each antenna design over the entire range of frequencies being employed by BPL. Measurements should then be taken in increments of no more than 100 kHz across the entire spectrum used by BPL, and the gain information from the graph should be utilized to compensate for the measured emissions in order to be consistent with a "theoretical" measurement made from an isotropic antenna resonant upon the same frequency. Due to the broad range of frequencies utilized by BPL, such an approach is necessary to ensure that accurate measurements are obtained.

19. To further assure emission compliance under real world circumstances, API also recommends that measurements be taken on the plane(s) parallel with the power transmission lines in a continuous manner designed to detect the greatest signal level upon any possible lobe, for a distance of at least one and one-quarter wavelengths up or down from the BPL device at the lowest frequency of operation, and on both sides of the power line, as well as underneath it.

[13] While measurement at a mid-band frequency might be appropriate for a point-source emitter, the FCC recognizes in the NPRM that BPL does not entail traditional point-source emissions. (NPRM at ¶ 36).

These measurements should be made at continuously varying heights through the plane(s) of the test regimen, as a narrow, high-gain lobe might exist at any given intersection with that plane. General measurements, taken without any consideration of high-strength lobes, are not adequate and will provide no assurance of compliance.

D. Priority Interference Resolution Procedures Should be Implemented for Public Safety and Critical Infrastructure Entities

20. For the reasons discussed herein, API believes that BPL operations will present a risk of interference to low-band land mobile systems, even if the various safeguards proposed by the Commission and others are adopted. Therefore, particularly given the safety functions served by many land mobile systems, it is extremely important that there be workable procedures in place to ensure that any such interference is terminated as quickly as possible.

21. At least with regard to public safety and critical infrastructure licensees, API urges the adoption of priority interference resolution procedures, including (but not necessarily limited to) the following: (1) requiring immediate shut-down of BPL operations upon a licensee's report of interference unless and until the BPL operator can prove it is not responsible for the interference or alter its operations to avoid the interference (see ¶ 14, *supra*); (2) if the BPL operator fails to comply, the Commission will -- where warranted to protect public safety -- issue an "emergency" Order mandating immediate shutdown; and (3) BPL operators should be required to notify their customers in writing prior to the initiation of service that service may be shut down indefinitely without notice upon a report of interference. Without such measures, public safety and critical infrastructure licensees may find themselves with no meaningful and timely recourse against harmful interference that threatens to paralyze their operations.

III. CONCLUSION

22. API appreciates the opportunity to comment in this important proceeding and urges the Commission to recognize that the expansion of BPL operations will present potential risks as well as potential benefits. In attempting to pave the way for BPL, the Commission should not lose sight of the priority status of *licensed* systems operating in the spectrum bands below 150 MHz and the important functions that they serve.

WHEREFORE, THE PREMISES CONSIDERED, the American Petroleum Institute respectfully submits the foregoing Comments and urges the Federal Communications Commission to act in a manner consistent with the views expressed herein.

Respectfully submitted,

THE AMERICAN PETROLEUM INSTITUTE

By: /s/ Wayne V. Black
Wayne V. Black
Nicole B. Donath
Its Attorneys

Randall D. Young
Telecommunications Engineer

Keller and Heckman LLP
1001 G Street, Suite 500 West
Washington, D.C. 20001
(202) 434-4100

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