

BEFORE THE  
**Federal Communications Commission**

WASHINGTON, D.C. 20554

**ORIGINAL ORIGINAL**  
**FILE** ✓

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**JAN - 8 1993**

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of ) Gen. Docket No. 90-314  
Amendment of the Commission's ) ET Docket No. 92-100 ✓  
Rules to Establish New )  
Personal Communication Services ) RM-7140, RM-7175,  
 ) RM-7617, RM-7618,  
 ) RM-7760, RM-7782,  
 ) RM-7860, RM-7977,  
 ) RM-7978, RM-7979,  
 ) RM-7980  
 ) PP-35 Through PP-40,  
 ) PP-79 Through PP-85

To: The Commission

**REPLY COMMENTS**  
**OF THE**  
**AMERICAN PETROLEUM INSTITUTE**

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**SUMMARY**

Throughout this proceeding, API has maintained that the proposed allocation of 2 GHz spectrum to personal communications services (PCS) will have an adverse impact on operations critical to the safe and efficient delivery of the nation's vital energy sources. Nonetheless, since it appears that the Commission has determined to reallocate portions of the 2 GHz bands to PCS, the reallocation proceeding must go forward in a manner which will minimize impact on incumbent licensees and the public safety.

API and other commenters urge the Commission to adopt adequate interference criteria to protect incumbent Private Operational-Fixed Microwave Service (POFS) operations from objectionable interference during the period in which the transition to PCS operations takes place. API and others generally support the use of the Telecommunications Industry Association's (TIA) Bulletin 10E interference protection standard. API is concerned that a misunderstanding of interference issues could lead to an erroneous application of the TIA Bulletin 10E standard. API urges the Commission to apply the standard in a conservative manner to insure that the sensitive operations of current POFS licensees will not face objectionable interference.

Moreover, the Commission must insure that the telecommunication needs of incumbent licensees are adequately met prior to the commencement of operations of any "unlicensed" PCS systems in the band. In this regard, API agrees with other commenters that the likelihood of unlicensed PCS systems being able to share spectrum with current fixed operations is extremely remote, and that some special mechanism must be devised for transition to any unlicensed PCS operations in the frequency range 1910-1930 MHz.

Additionally, the Commission must insure that its procedures for the transition to PCS operations in the band will provide adequate time, replacement spectrum and/or technologies as well as capital resources to insure that any actual handoff of incumbent operations to new facilities is as "seamless" as possible. Those PCS providers which displace incumbent POTS licensees must be willing to assume all relocation costs.

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AMERICAN PETROLEUM INSTITUTE

The American Petroleum Institute ("API"), by its attorneys, pursuant to the invitation extended by the Federal Communications Commission ("FCC" or "Commission" or "Agency") in its Notice of Proposed Rule Making ("Notice")<sup>1/</sup> in the above-referenced proceeding, respectfully submits the following Reply Comments for consideration by the Commission.

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<sup>1/</sup> Notice of Proposed Rule Making and Tentative Decision 7 FCC Rcd. 5676 (1992). Time for filing Reply Comments in the proceeding was extended to January 8, 1993, DA 92-1600 (Released November 24, 1992).

I. BACKGROUND STATEMENT

1. API filed Comments in this proceeding on November 9, 1992, noting that while API does not object to the implementation of personal communications service (PCS), the chosen spectrum in the 1.85-1.99 GHz band ("the 2 GHz band") now supports important fixed telecommunications operations of API's members. Accordingly, API urged the Commission to proceed with the reallocation in a manner which would minimize harmful impact on essential Private Operational-Fixed Service (POFS) operations now conducted in the band.

2. The functions now performed by petroleum and petroleum pipeline companies in the 1850-1990 MHz band insure the safe and efficient production and delivery of the nation's vital energy sources. Since the public safety and welfare are of paramount concern, API urged the Commission to take every possible measure to insure that the transition from POFS to PCS operations in the band will not disrupt incumbent operations or harmfully impact public safety. Further, API asked the Commission to insure that incumbent licensees will obtain adequate replacement spectrum and/or technologies to enable them to continue to provide the

services now performed in the band, prior to usage of incumbent's present frequency assignments for PCS purposes.

3. API's position that the transition to PCS operations must take place in a manner which will preclude interference to POFS operations is shared by many parties. Numerous commenters likewise agree with API that strict interference criteria must be established by the Commission which will insure protection of POFS operations from objectionable interference created by PCS operations in the band. Additionally, there is almost universal agreement that sharing between POFS operations and "unlicensed PCS" is a practical impossibility. A separate relocation method must be established to provide for the needs of incumbent licensees in spectrum targeted for unlicensed operations prior to use of the spectrum on an unlicensed basis.

## II. REPLY COMMENTS

4. API supports Commission efforts to bring, where feasible, new technologies to the public with a minimum of delay. Nonetheless, API reminds the Commission that regardless of the perceived consumer appeal for a proposed new service, the Commission bears an affirmative obligation to render allocation and transition decisions on a basis

consistent with the public interest. In this regard, API is pleased to see that the Commission is attempting, through the current proceeding, to develop a means by which the implementation of PCS may go forward with a less negative impact on POFS operations in the 2 GHz band than would occur with an immediate and wholesale reallocation effort. However, while API is pleased that the Commission is attempting to diminish the migration burden faced by incumbent licensees, API seeks assurance that the Commission's plan will recognize the need of incumbent POFS licensees for highly reliable communications service. API notes that several commenters share these concerns, and API urges that the Commission carefully review its proposed transition plan to insure that adequate time, technology, and, capital, are readily available to minimize the harmful impact of the proposed reallocation on the public welfare.

**A. The Commission Must Adopt Adequate Interference Criteria to Protect POFS Operations**

5. API is pleased by the Commission's proposal to adopt suitable interference criteria to protect POFS operations from the interference created by PCS transmissions. API is in agreement with the Commission that the current interference protection standard for 2 GHz fixed

microwave operations contained in the Telecommunications Industry Association's (TIA) Bulletin 10E is not entirely adequate, standing alone, to prevent objectionable interference to fixed microwave stations from PCS base and mobile operations. API is in general agreement with the Commission's proposal to modify the TIA 10E standard to take into account the mobile nature of PCS operations, and agrees with other commenters that the interference standard must offer workable parameters for shared POFS/PCS spectrum usage.<sup>2/</sup>

6. More specifically, API agrees with the Commission and others that for interference analysis purposes, each PCS licensee must determine interference potential by calculating the signal level from each proposed co-channel and adjacent channel PCS base station and all associated mobiles at the input of each victim fixed microwave receiver within the particular coordination zone.<sup>3/</sup> Further, in making this determination PCS licensees should be required to calculate the total PCS power level at the subject microwave receiver from each base station and its associated

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<sup>2/</sup> Comments of Utilities Telecommunications Council (UTC), at 7.

<sup>3/</sup> Id.

mobile and portable stations. Should the PCS power level at the microwave receiver exceed the TIA 10E standard the PCS licensee must make whatever adjustments are necessary to bring its system into compliance with the 10E standard.

7. API is concerned that some PCS proponents misunderstand the need for reliability and dependability with regard to current POFS systems and seek to undermine the proper application of the Bulletin 10E standard for interference analysis. For example, some PCS proponents support the idea that interference protection criteria should reflect POFS system designs engineered for a particular "reliability level" rather than for a fixed fade margin.<sup>4/</sup> API does not completely disagree with this approach, provided that two critical issues are addressed. First, the expected "reliability level" of the subject microwave path must be such that a sufficient level of reliability is maintained throughout a complete "multi-hop" microwave system. Moreover, for short paths, it is impossible to engineer an adequate fade margin for analog paths purely on the basis of a "reliability" analysis because as path lengths become shorter, the fade margin

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<sup>4/</sup> Comments of Bell Atlantic Personal Communications, Inc. (Bell Atlantic), at 45-48; Comments of Motorola, Inc. (Motorola), at 34-35.

which would be mandated by the "reliability" analysis requirement will not provide adequate noise suppression to maintain acceptable transmission standards. Even some PCS interests concede that, in the case of analog paths, a minimum of 75% of the typical 40 db fade margin will be necessary to maintain a usable signal-to-noise ratio.<sup>5/</sup>

8. It is also incorrect to state, as some commenters do, that the existing 10E standards were premised on the assumption that POFS systems employ "multiple hops" and operate in a "cascade" manner.<sup>6/</sup> While API agrees that interference standards could perhaps contain an allowance to account for differential between "single hop" versus "multi-hop" systems, it is difficult for designers to know in advance whether a given single-hop POFS system will need to be expanded or operated in conjunction with other facilities in the future. Accordingly, without strict reliance on the current 10E standard, "end-to-end" reliability objectives would be difficult to meet. This could possibly preclude modification and/or expansion of POFS systems following original construction. API is also concerned that PCS proponents believe that spectrum sharing between PCS and

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<sup>5/</sup> Comments of PCN America, Appendix 1, Fig. 3.

<sup>6/</sup> Comments of Motorola, at 35-36.

POFS licensees is workable provided that PCN licensees simply keep each source of interference from a PCS base station and handset below the level specified in Bulletin 10E.<sup>7/</sup> The Bulletin 10E standard was designed to operate in a microwave environment in which having ten or more separate cases of interference to a given "victim" receiver would be a rarity. In a PCS environment, potentially hundreds or thousands of interference cases are presented. According, it is highly impractical to let each individual PCS transmitting unit reach the 10E threshold interference level since the sum of all cases would clearly result in intolerable interference.

9. PCS proponents have argued that the 10E standard is overly stringent because it requires each new case of interference to be 6 db below the level of ambient noise that existed when the airwaves were "clear", not 6 db below the level of cumulative interference that now exists in congested areas. They suggest that an ever increasing level of interference should be allowed based on an incremental change from what now exists, rather than based on a fixed standard.<sup>8/</sup> While this approach may appear workable, it

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<sup>7/</sup> Comments of PCNA, Appendix I, at 17-18.

<sup>8/</sup> Comments of Bell Atlantic, at 45-48.

poses significant problems, because as new paths or systems are coordinated, the background noise level will rise exponentially rather than linearly. Such noise levels could preclude effective point-to-point microwave communication and would be intolerable from API's members standpoint.

10. Further, it is argued that employment of the Bulletin 10E standard can be made significantly less stringent provided that POFS systems consistently utilize space diversity techniques. Moreover, others contend that Bulletin 10E provides no allowance for the use of active avoidance techniques, such as adaptive power control, by PCS licensees.<sup>9/</sup> While space diversity techniques are of some value in lessening interference potential, the benefits of such techniques would diminish rapidly with the reduced fade margins proposed by PCS interests who support the "reliability" engineering approach discussed above. The use of adaptive power control and other active avoidance techniques by PCS licensees will provide some additional protection measure to POFS operations, however, such techniques simply restrict a transmitter from operating at any greater output level than is required for reception by the intended receiver. These techniques are not now proven

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<sup>9/</sup> Comments of PCNA, at 8-12 and 16-18; Southwestern Bell (SWB), at 28-31.

to lower interference levels sufficiently to allow a reduction in the Bulletin 10E interference criteria. It would be foolhardy to rely on these techniques to assure specified interference levels when the technology is unproven and there is no analytical basis for quantifying the benefits from such technologies. While API does not disagree that active avoidance techniques, when tested and quantified, can be an important element in successful spectrum sharing between PCS and POFS operations, they should not be relied upon prematurely.

11. API is also concerned that the Commission is urged to insert a factor into the interference analysis which would account for how "critical" the operation of a given POFS system may be.<sup>10/</sup> API reminds the Commission that the great majority of 2 GHz microwave paths are in operation because microwave technology offers heightened reliability for operations critical to the safety of life and property as well as the environment. Accordingly, any attempt to lower interference criteria due to the perceived value of a given path is totally unwarranted.

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<sup>10/</sup> Comments of PCNA, Appendix I, at 2-5 and 23-24.

12. API opposes the use of "statistical models" for calculating path losses for PCS mobile units. While API is pleased to see that a consensus is growing in favor of path prediction methods which take into account terrain and path geometry,<sup>11/</sup> such models alone are still insufficient to provide the interference protection level needed for critical POFS system. Certainly, some of the more sophisticated path prediction methods which account for terrain features such as hills and the horizon are more reliable than statistical models such as the HATA equation which do not account for such factors. Nonetheless, until further research and experimentation has been performed to determine the viability of spectrum sharing, API agrees with other commenters that interference calculations must provide "worst case scenario" protection, and should be based on actual "line-of-sight" path loss figures rather than on probabilities.<sup>12/</sup> Moreover, API disagrees with the assertions of PCN interests that possible free space transmission by a "rogue PCS transceiver" operated perhaps from a roof or a balcony should not be factored into the interference prediction equation because the statistical probability of a concurrent transmission by the interfering

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<sup>11/</sup> Comments of PCNA, Appendix I, at 19-20; Comments of CNet (Appendix E).

<sup>12/</sup> Comments of UTC, at 10.

PCS transceiver and fading of the microwave path to a victim receiver is very slight.<sup>13/</sup> While such an argument sounds convincing, the worst case scenario presented by PCNA that predicted a "low probability" of interference, did not consider that the interference probability would be multiplied by the total number of PCS units that potentially could be operating in a free space situation at a given moment.<sup>14/</sup> Since thousands of units may be operating simultaneously, the probability is not as slight as PCNA suggests.

13. API agrees with other commenters that for the purpose of interference protection calculations, all potential PCS mobile units planned for operation in a given area must be presumed to be operating simultaneously.<sup>15/</sup> Further, in locations where clustered operations of PCS transmitters could occur (i.e., downtown business districts, "special events locations" such as stadiums, etc.) an extra factor must be entered into the interference analysis to account for the high concentration of PCS transmissions within a confined area.

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<sup>13/</sup> Comments of PCNA, Appendix I, at 16-17.

<sup>14/</sup> Id.

<sup>15/</sup> Comments of UTC, at 12; Public Safety Microwave Committee (PSMC), at 4.

14. API agrees that limits on PCS power and antenna heights should be imposed. API believes that the proposed limit of 10 watts EIRP for base stations and 2 watts EIRP for mobiles possibly is workable, provided that strict compliance with the Bulletin 10E interference standard is maintained with regard to POFS operations. However, API and others find the proposed 300' maximum antenna height to be excessive since such an antenna height coupled with the proposed output power levels would establish a standard cell size of approximately 2,000 square miles.<sup>16/</sup> Certainly a cell size of this magnitude is inconsistent with the microcell concept, and provides a larger operational area than most PCS systems likely would need. Moreover, such levels would increase the potential for interference to existing POFS operations.

**B. The Commission's Plan to Allocate PCS Spectrum Blocks Must be Modified to Minimize Impact on POFS Operations**

15. API remains somewhat concerned over the Commission's plan to grant three competitive PCS licensees

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<sup>16/</sup> Comments of UTC, at 14 and 15.

per market giving each licensee 30 MHz of spectrum.<sup>17/</sup> As indicated in its comments, API believes that the plan is an unnecessary and wasteful "over allocation" to PCS which will create significant amounts of fallow spectrum.<sup>18/</sup> An allocation of spectrum to PCS in 20 MHz blocks will provide adequate spectrum resources to PCS, minimize potential interference problems between PCS and POFS interests, and thereby insure faster and more efficient PCS deployment.

16. Since API's proposed block allocation plan would mean that 60 MHz rather than 90 MHz initially would be allocated to PCS in each market, and that overall impact on critical incumbent fixed operations will be further minimized. Accordingly, the Commission should adopt API's proposed block allocation methodology. API recognizes that there was a wide divergence of views on the appropriate size of PCS spectrum blocks. API's overriding concern in this areas is that regardless of what allocation the Commission adopts, the agency should couple the allocation with adequate interference protection criteria as described

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<sup>17/</sup> Notice, ¶ 34.

<sup>18/</sup> API Comments at 6-8.

herein, to lessen the potential for interference to POFS operations.

**C. The Commission Must Insure that the Telecommunications Needs of Incumbent Licensees are Adequately Met Prior to Commencement of Operations of Any Unlicensed PCS Systems**

17. The Commission's proposal to allow unlicensed PCS operations at 1910-1930 MHz is unworkable. API notes the almost universal agreement with this position by the commenters in this proceeding.<sup>19/</sup> Review by API and others confirms that the Commission's unlicensed PCS proposal would create intolerable interference to POFS operations and would moreover, make it impossible for POFS licensees to detect the sources of interference for remediation purposes. Accordingly, API remains convinced that the Commission should make "data-PCS" a licensed rather than an unlicensed service. Moreover, the Commission must require that such operations conducted at 1910-1930 MHz be subject to the identical application and coordination procedures and technical limitations required for PCS licensing in other portions of the band 1850-1990 MHz.

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<sup>19/</sup> See e.g., Comments of PSMC, at 6-8; UTC, at 17-18; Alcatel Network Systems (attachment "Specific Comments Regarding Unlicensed PCS operations").

18. Should the Commission proceed to authorize operations at 1910-1930 MHz on an "unlicensed" basis, the agency must provide a transition mechanism whereby incumbent POFS operators are granted an adequate transition period, rapid access to suitable replacement spectrum and/or technologies as well as adequate compensation for migration costs. API is also seriously concerned that adjacent channel interference will be created by unlicensed operations in the 1910-1930 MHz band. At a minimum, lower power devices only should be allowed to operate at the band edges. In addition, the Commission should require manufacturers selling type accepted equipment for unlicensed operation to provide funding to cover the migration costs of incumbent licensees.<sup>20/</sup>

19. API initially suggested a one-year transition period. This period was intended to allow the 1910-1930 MHz

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<sup>20/</sup> API proposed that manufacturers desiring to market equipment in this band establish an escrow fund which would be used to pay replacement costs of POFS licensees who would be forced to migrate from their spectrum assignments. A figure of \$100,000 per station was the initial nominal level suggested for the escrow funding. API does not suggest that incumbent licensees be limited to \$100,000 per station as replacement costs. Licensees must be able to recoup actual replacement costs -- whether these are greater or less than the "per station" funding level. Equipment manufacturers would be required to increase funding of the escrow if the initial amounts did not cover replacement costs, and likewise would receive refunds of any amounts not expended.

POFS licensee time to notify the Commission that (1) it intends to relocate its microwave paths and (2) to request reimbursement from the escrow fund for replacement costs. As long as the licensee made such notification within the appropriate time frame, it would be eligible for compensation for actual replacement costs. It must be recognized that it will not be possible for all licensees to complete the replacement process within a time period as short as one year. In fact, upon review of actual licensee records, it appears that petroleum licensees operate upward of 170 stations in this spectrum. One company is the licensee of over forty stations at 1910-1930 MHz. This being the case, the Commission should consider a longer transition period of eighteen (18) months for these licensees to notify the Commission of their intent to vacate and to request reimbursement before any data-PCS equipment is certified.

**D. The Commission Must Insure Fundamental Fairness in Any Migration Proceedings**

20. API remains in fundamental agreement with the Commission that all incumbent migration costs must be assumed by the PCS licensees seeking to displace existing 2 GHz users. API is concerned that "adequate compensation"

not merely provide a displaced incumbent licensee with the depreciated value of the equipment used to provide a fixed link. Such a formula does not take into account the fact that it is not only equipment, but the actual telecommunications link itself which must be replaced. Accordingly, API reasserts that all costs including engineering and planning costs, equipment, and any additional interface equipment or other facilities needed to integrate a new path into an existing 2 GHz system must be taken into account in such cost calculations. Moreover, the formula must include the cost of replacement of analog equipment with digital equipment as needed since digital equipment may be more readily available.<sup>21/</sup>

21. Additionally, the Commission should establish a mechanism to resolve disputes over actual relocation costs and comparability of replacement facilities. The availability of such assistance will become particularly critical after involuntary relocation procedures become

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<sup>21/</sup> API will offer further discussion of migration cost analysis factors in its forthcoming Comments in response to the Commission's Third Notice of Proposed Rule Making in the related "Emerging Technology" proceeding, ET Docket No. 92-9. Since the Commission's transition rules for existing 2 GHz licensees are under development in Docket No. 92-9, API agrees with UTC that the Commission should seek comment on PCS transition mechanisms only after the conclusion of that proceeding. UTC Comments at 30.

available to new technology licensees. API will comment further on possible arbitration and/or mediation guidelines in Docket No. 92-9.

**F. The Commission Must Insure that the Transition Plan Will Allow a Secure and Reliable Handoff of Incumbent Operations**

22. API is in general agreement with the Commission that the transition from fixed operations in the band 1850-1990 MHz to PCS should insure maximum telecommunications security and minimal hand-off problems as migration takes place. API is pleased to see that numerous other commenters reflect API's concerns that the transition take place in an orderly and safe manner.<sup>22/</sup>

23. Accordingly, the Commission should establish a minimum 5 year transition plan during which time POFS operators would maintain primary status in the 2 GHz band and during which relocation of incumbent users would be on a purely voluntary basis. Incumbent licensees must also remain primary during the involuntary relocation period which follows the five year transition period. In other words, an incumbent 2 GHz licensee would always remain co-

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<sup>22/</sup> See e.g. generally Comments of PSMC, UTC, Edison Electric Institute.

primary unless and until the licensee voluntarily or involuntarily relocates. API believes that this approach will allow incumbent licensees to be assured of continued use of present frequency assignments for an established period and will also provide PCS proponents with a measure of certainty that spectrum will be made available in the band within a definitive time frame if necessary. Moreover, this approach will assure adequate time for the planning and construction activities needed to assure that POFS migration takes place with minimal service interruption.

**G. The Commission Should Establish Compatibility Standards and a Competitive Market for PCS**

24. As potential PCS users, API's members have an interest in insuring that when PCS becomes available, interoperability capabilities are maximized and that PCS is offered on a highly competitive basis. Accordingly, API and others urge the Commission to create uniform technical rules and standards for all PCS equipment to insure interoperability.<sup>23/</sup> Further, API urges the Commission to act with other national and international regulators to make certain that interoperability of both equipment and operating protocols will further the goal of international

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<sup>23/</sup> Comments of TIA, at 5-8, Comments of UTC, at 41.

PCS compatibility. With regard to the geographic parameters of PCS service areas, API urges the Commission to support the option it determines will best promote competitive service delivery.

### III. CONCLUSION

25. API reasserts its general support for the development of new technologies such as PCS. Nonetheless, since the Commission proposes to assign spectrum in the band 1850-1990 MHz to PCS, API believes the Commission must adopt interference criteria and a transition framework which will insure minimal disruption of critical POFS operations during the introduction of PCS into the band.

26. Adequate record support is demonstrated for API's belief that the Commission's proposed transition plan, while fundamentally solid, must be modified to insure that a trouble free handoff of fixed service operations takes place. Accordingly, API urges the Commission to incorporate within its transition plan a minimum five year period for voluntary negotiations. API strongly urges the Commission to adopt the TIA Bulletin 10E interference standard to insure that POFS operations can continue with the same degree of reliability in a shared spectrum environment. API