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November 16, 1994

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BY HAND

Mr. William F. Caton  
Acting Secretary  
Federal Communications Commission  
1919 M Street, N.W., Room 222  
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY

Re: Permissible Ex Parte Presentations in  
PR Docket No. 92-235

Dear Mr. Caton:

Pursuant to Section 1.1206 of the Commission's rules, this is to inform the Commission that the undersigned and Mr. Art McDole, a representative of the Association of Public-Safety Communications Officials-International, Inc. ("APCO"), along with representatives of other private land mobile user groups, met with the following members of the FCC staff on November 15, 1994, to discuss the above-captioned proceeding:

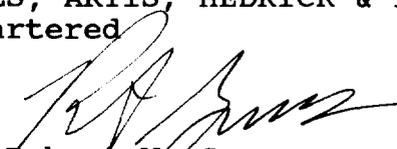
Ms. Kathryn Hosford	Mr. Ira Keltz
Mr. Herbert Zeiler	Mr. Joe Levin
Mr. Ron Netro	

During the course of the meeting, the attached materials prepared by APCO were distributed to the FCC staff and other attendees.

Please contact the undersigned if you have any questions.

Respectfully submitted,

WILKES, ARTIS, HEDRICK & LANE  
Chartered

By:   
Robert M. Gurss  
Attorneys for APCO

cc: Ms. Kathryn Hosford  
Mr. Herbert Zeiler  
Mr. Ron Netro  
Mr. Ira Keltz  
Mr. Joe Levin

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FEDERAL COMMUNICATIONS  
OFFICE OF RECORDS

PUBLIC SAFETY USERS OPPOSITION TO 5 kHz CHANNEL SPACING

In various filings and ex parte submissions to the Commission APCO has strongly opposed 5 kHz channel spacing. The principal reasons follow.

1. Based on equipment which has not been fully field tested and proven as capable of performing the necessary function.
2. As channel widths are reduced performance suffers, signal to noise ratio suffers, and throughput is reduced.
3. Proposed 5 kHz equipment does not appear to be readily adaptable to encryption, which is demanded by the Federal agencies and highly desirable for local government.
4. Field tests indicate range will be reduced and additional repeaters will be required in many instances. In rural and mountainous terrain this will not only be expensive, but sometimes impossible, as sites are not available.
5. Interoperability for mutual aid purposes is absolutely necessary, and 5 kHz equipment does not appear compatible with either existing or proposed FM equipment.
6. As bandwidths are narrowed and channels are increased the potential for intermodulation is dramatically increased. This is an exponential, rather than a linear progression. For example: Number of Intermodulation Products per MHz.

15 kHz - two signal, 3rd or 5th order	6500
15 kHz - three signal, 3rd order	235,000
5 kHz - two signal, 3rd or 5th order	37,000
5 kHz - three signal, 3rd order	2,780,000

This problem is exacerbated by the numerous shared radio sites. Such sites are a virtual necessity in many parts of the country. While the actual radio equipment may incorporate protection, the sites themselves are vulnerable to signal mixing, due to non-linear devices, such as metal fences, joints in metal towers etc. These problems presently exist and would be increased in the exponential fashion described.

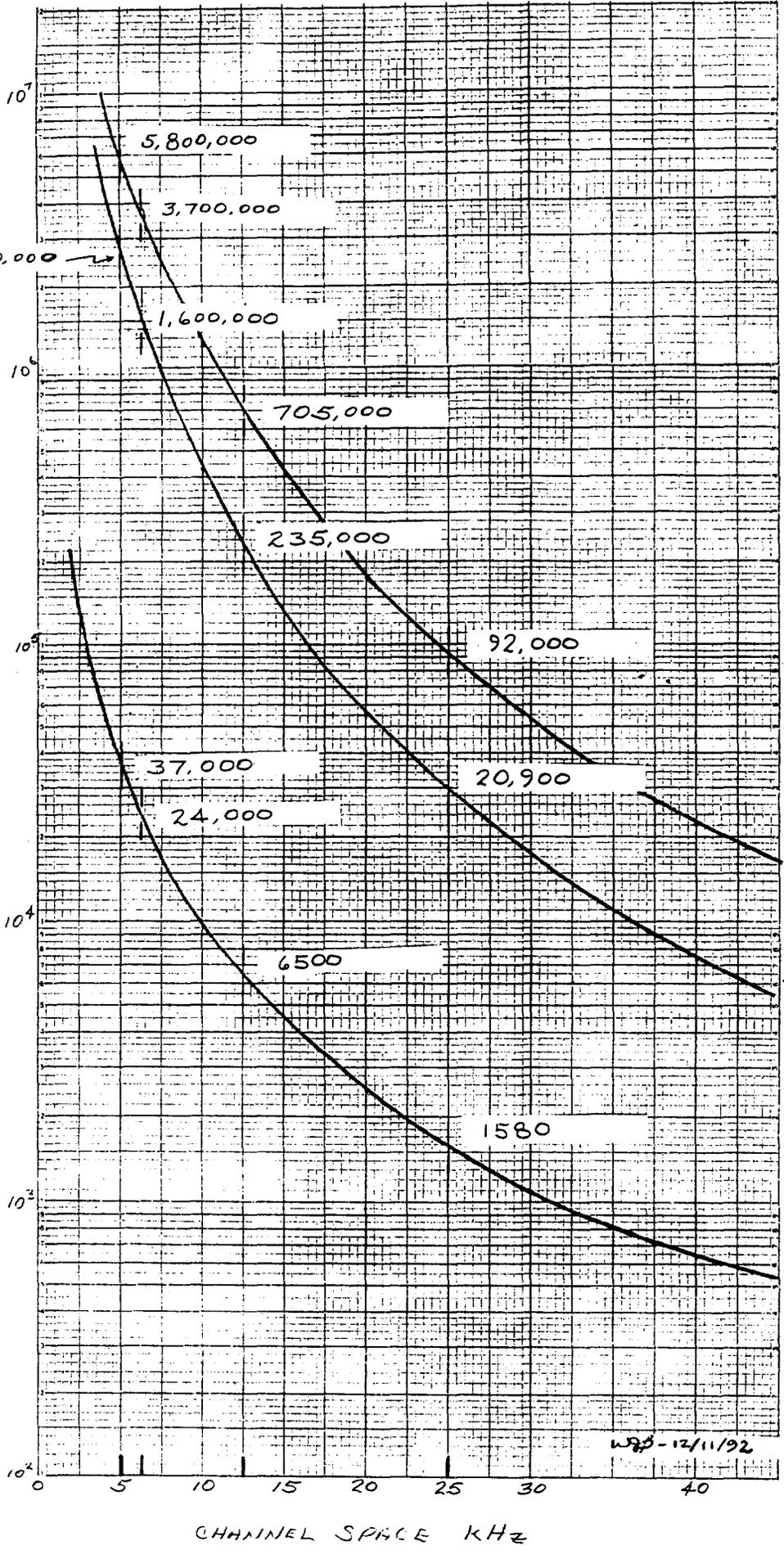
7. The radio transmitters and receivers may be narrowbanded, but there is a finite limit to the necessary associated devices, such as antenna duplexing schemes. These appear to be approaching or have reached, a capability which is a great deal wider than even existing channel spacing. Narrowing channels will not necessarily provide more usable channels, particularly at shared sites.

In summary, channel spacing should not be predicated upon a technology with so many limiting factors.

1. N. S. 22-B (8-50)  
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.

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GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.

NUMBER OF INTERMODULATION PRODUCTS PER MHz



THREE SIGNAL 5TH ORDER

THREE SIGNAL 3RD ORDER

TWO SIGNAL 3RD OR 5TH ORDER

WSP-12/11/92

## CHANNELIZING 150/160 MHz BAND

This portion of the spectrum presents the greatest challenge. It is presently configured for 30 kHz channels, which for all practical public safety purposes is considered to be 15 kHz spacing. Further, these channels are presently allocated in Service blocks. As a result of prior actions and channel splitting, these block allocations are interspersed in many instances. This interspersing not only includes public safety services, but virtually all services listed in Part 90. Adjacent channels in Public Safety are listed herein.

Local Government adjacent to Police	27
Local Government adjacent to Fire	13
Local Government adjacent to Special Emergency	1
Local Government adjacent to Business	1
Police adjacent to Forestry/Conservation	1
Police adjacent to State Police	5
Police adjacent to Business	1
Fire adjacent to Local Government	7
Highway Maintenance adjacent to Police	14
Highway Maintenance adjacent to Forestry/Conservation	1
Special Emergency adjacent to Police	9
Total affected channels	80

If channel widths are to be further reduced, these must be considered. In the simplest illustration, if the 15 kHz channels were reduced to 7.5 kHz, it would require consideration of not only those frequencies that are adjacent within a particular Service, but those which are adjacent to those of another Service, such as shown in the above 80 instances.

As a suggestion, those channels which fall within a single Service could be allocated to that Service, and those which fell adjacent to a different Service could be allocated to the Local Government Service, where all other Public Safety Services are eligible. The ultimate potential for approximately 200 new channels exists.

If 12.5 kHz and 6.25 kHz spacing is contemplated, the problem becomes much more complicated, as virtually every channel

must be shifted. In this instance approximately 40 new channels would ultimately be created at 12.5 kHz and 250 plus at 6.25 kHz. However the migration path becomes much more difficult, as the number of affected agencies and services is greatly increased.

## APCO COMPROMISE POSITION ON 150/160 MHz BAND

APCO in its first filing strongly opposed the proposed 5 kHz channel plan, and the suggested assignment of these channels. This opposition has not diminished, but is reaffirmed.

APCO suggested 12.5 kHz channels, to migrate to 6.25 kHz over a relatively long time period. This was based primarily on two factors - a: the potential of gaining additional channels over present 15 kHz spacing and b: the potential of obtaining additional federal channels, either directly above or directly below present public safety blocks.

APCO stated support for the ARR 15/7.5 kHz channel plan, based on minimal disruption to existing licensees. This is still a strong consideration.

APCO believes that the matter of graceful migration is of utmost importance, and should take precedence over any attempt to create a plan based on any pure mathematical division of existing channels. The following factors are of utmost importance to public safety users. The order of listing does not necessarily indicate priority.

1. Compatibility/Interoperability (essential for mutual aid)
2. Graceful migration - least amount of disruption to existing systems, mutual aid plans, etc. Provision for phased implementation.
3. Requirement for practical, workable systems with adequate coverage.
4. Cost effectiveness.
5. Capability of utilizing technological developments.
6. Spectrum efficiency.

The current development of digital equipment offers a great deal of hope for improving spectrum efficiency and performance in concert. However, there is a finite limitation on the amount of bandwidth required for not only voice, but the ever increasing need for high speed data transmission. All new technology must be provided with adequate spectrum, or it cannot be successful.

In consideration of all the above, APCO concludes that the most acceptable channel scheme would be as follows:

150 MHz to 160 MHz - Retain existing 15 kHz channels, but require 12.5 kHz equipment within a reasonably short time frame. Channelize to 7.5 kHz by inserting a new channel in the center of all existing 15 kHz channels. As migration progresses, these 7.5 kHz channels could be utilized on either a geographically separated basis with 12.5 kHz equipment, or with 6.25 kHz equipment for even greater usage.

450 MHz to 512 MHz - Retain existing 25 kHz channels, but

require 12.5 kHz equipment within a reasonably short time frame. Create new channels by inserting a new channel in the center of each 25 kHz channel, and further new channels by inserting 6.25 kHz channels in the center of each 12.5 kHz channel. New channels could assigned using state of the art equipment or a combination of such equipment and geographical spacing.

Powers for public safety services should be kept to the minimum required for adequate coverage of the political jurisdiction of the licensee. This should be based on radiated field strength, verified by computer generated programs and field measurements as necessary.