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**Before the**
**Federal Communications Commission**
**Washington, D.C. 20554**

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| In the Matter of | ) | |
| | ) | |
| Improving Public Safety Communications in the 800 MHz Band | ) | |
| | ) | |
| | ) | WT Docket No. 02-55 |
| Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels | ) | |
| | ) | |

**Initial Comments of**
**Pinnacle West Capital Corporation**

Pinnacle West Capital Corporation, an Arizona corporation ("**Pinnacle West**") hereby submits its initial comments (the "**Initial Comments**") to the Federal Communications Commission (the "**FCC**" or the "**Commission**") in response to the Commission's Notice of Proposed Rulemaking (the "**NPRM**"), in the Docket referenced above.[1]

## I. Pinnacle West's Interest in this Docket

Pinnacle West is a publicly-traded holding company, two of whose subsidiary companies are principally engaged in the energy business, including the generation, transmission, distribution and sale of electricity to (a) wholesale customers throughout the Western United States, and (b) to retail electric customers in the States of Arizona and California. Chief among its operating subsidiaries is Arizona Public Service Company ("**APS**"), a public service corporation organized and operating under the laws of the State of Arizona. APS is Arizona's largest electric utility company, serving approximately 874,537 customers in 11 out of the State's 15 counties.[2]

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[1] Published in the Federal Register on April 5, 2002, Vol. 67, No. 66, at page 16352.

[2] This total customer count is at year-end 2001.

Another wholly owned subsidiary of Pinnacle West is Pinnacle West Energy Corporation, an Arizona corporation ("**PWEC**"), which is engaged in the generation and sale of wholesale electricity throughout the Western United States.[3]

APS generates electricity from power plants located in Arizona and New Mexico. These plants include gas and coal-fired generators, as well as nuclear power generated from the Palo Verde Nuclear Generation Station ("**Palo Verde**"), the Nation's largest nuclear power plant, located approximately 50 miles west of Phoenix, Arizona.

PWEC generates electricity from gas-fired electric generating units located in central Arizona.

Both APS and PWEC rely extensively upon a dedicated communications network[4] for the integrated operation and management of utility plant and personnel.[5] In addition to a comprehensive network of communication sites throughout Arizona and Northern New Mexico used in the dispatch of electric generation within their systems, APS and PWEC personnel are reliant upon a communications system to assure that power plants and interconnected electric transmission and distribution are operated in a safe and reliable manner. APS, as both a generation and transmission/distribution entity, is responsible not only to its electric consumers but also to other electric utilities and generators who rely upon its transmission grid in Arizona for the transmission of electricity from and to points in the Western United States.

To support this infrastructure and position itself in the 21st Century to meet both voice and mobile data requirements, APS started an upgrade project in 1998 to relieve its aging VHF radio system which it had relied upon for the past 30 years. Ironically, APS chose to move to the 800 MHz band to relieve itself primarily from radio frequency interference ("**RFI**") and the limitations being imposed upon the VHF band by then recent FCC rule changes. APS viewed the 800 MHz band as a place where once again radio communications could be relied upon to serve the needs of its critical utility operations. Therefore, APS and Pinnacle West have to date licensed frequencies, purchased, and installed 28 sites with a new state-of-the-art Motorola SmartZone wide area radio system. In total, over 32 sites in Arizona are planned. This large network

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[3] Pursuant to regulations promulgated by the Arizona Corporation Commission (the "**ACC**") -- the state agency charged with regulatory responsibility over retail sales of electricity in Arizona -- and a Settlement Agreement approved by the ACC in September, 1999, APS is required to transfer its fossil and nuclear electric generating plants to PWEC by December 31, 2002, in connection with the introduction of retail electric competition in Arizona. As a result of this restructuring, PWEC will own and operate all electric generating stations presently owned and operated by APS. APS with then be engaged exclusively in the transmission and distribution of electricity in Arizona, generated by PWEC and other electric utilities for wholesale or retail sale in Arizona.

[4] Described hereinafter and with further particularity at page 2 of Appendix A, attached hereto.

[5] Since January 1, 2000, this communications network has been managed and administered by Pinnacle West's Telecommunications Department, as a result of a corporate restructuring that resulted in the transfer of this Department from APS to its parent, Pinnacle West.

covers all major municipalities and counties serving a fleet of radio users that numbers over 2,800. APS has had some inquiries by these same municipalities and counties – including public safety elements within these jurisdictions -- into the feasibility of sharing this critical radio communications infrastructure. In those discussions with them, interoperability and radio system reliability become the major topic of discussion.

Also reliant upon this radio system are federal, state and local authorities that coordinate their responsibilities in the area of public safety with the Company, APS and PWEC. No where is this more apparent than in respect to the operation of Palo Verde, which, as a facility licensed by the Nuclear Regulatory Commission (the "**NRC**"), is responsible for the implementation and operation of an emergency plan to be utilized to protect the public health and safety in the event of an incident at Palo Verde.

Through the Palo Verde emergency plan and other public safety aspects of their operations, APS and PWEC closely coordinate and are integrated with the public safety operations of federal state and local government agencies in the areas where they operate.[6] Through interoperability, these agencies largely rely upon APS's involvement, coordination and cooperation to assist in the performance of important functions aimed at preserving life and property.[7] Although Pinnacle West's two utility subsidiaries can be classed as critical infrastructure,[8] it is plain that they play a more essential role in the ability of public safety agencies to discharge their governmental responsibilities.

This is made all the more apparent and compelling in the wake of the terrorist attacks upon the World Trade Center and the Pentagon on September 11, 2001.

## II. Executive Summary of the Company's Comments

Based upon the discussion that follows, it is the Company's belief and position that:

1. Critical infrastructure needs to be recognized for what it is: an integral teammate of Public Safety, sharing equivalent concerns and objectives for the preservation of public health and safety. As such, the use of the 800 MHz Band by critical infrastructure should be afforded a higher priority.

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[6] See, *e.g.*, Appendix A, at page 12.

[7] A prime example of this integration and cooperation occurred on the eve of January 1, 2000, when, in preparation for operating issues that might result from the so-called "Y2K Bug", APS teamed with local public safety agencies – including the Arizona Department of Public Safety, Maricopa County Civil Defense and the Arizona Department of Emergency Services to proactively position themselves in case of dislocations caused by the Y2K Bug. This included use of APS radio equipment operating in the 800 MHz Band as a prime means of communication among members of this team.

[8] See, *e.g.*, NPRM, Para. 37, at page 22.

2. Compelling that critical infrastructure, like electric utilities, move to another band (in preference to making non-compliant, interfering users correct their transgressions) materially and adversely disrupts operating integrity and efficiency that is key to the preservation of public health and safety.

3. Allowing compensation to critical infrastructure for the cost of transition does not mitigate the harm resulting from disruption of systems designed to preserve public health and safety, considering that technological support is not as readily available as it presently is in the 800 MHz Band.

4. In the process of this NPRM, the FCC should promptly reaffirm its commitment to active and consistent oversight of the 800 MHz Band by assuring that licensed users utilize their portions of the band in accordance with the terms and conditions under which their licenses were issued, failing which, they be made to remedy the consequences of their compliance failure, including prompt elimination of the adverse effects on neighboring users in the band and compensation to neighboring users for the consequences of their non-compliance. Harmed users should not be made to get out of the way of non-compliant users.

## III. Discussion

### A. Preliminary Considerations

Attached hereto as Appendix A are included specific reactions and recommendations by the Company to the numerous technical issues posited by the Commission in the NPRM. In the following discussion, however, is set forth basic matters of policy that underscore the Company's technical comments and set a basic framework for understanding the context in which they are presented.

Additionally, the Company has reviewed – and throughout the reply comment period will continue to review -- the positions taken in this Docket by other commenters which share a common interest, such as the United Telecom Council ("**UTC**"), of which the Company is a member. The Company's comments in this submittal are intended to supplement those important positions taken by UTC.[9] They focus attention upon the specific attributes of the Company's situation which raise material concern about the

[9] Although the Company generally agrees with the positions stated by UTC, it needs to be pointed out that UTC's position reflects a broader spectrum of telecommunications users than just those classed as critical infrastructure that are engaged in the electric utility industry. As is stated throughout the comments made by Pinnacle West, electric utilities are closer in their operating profile to that of Public Safety users and, accordingly, we stress that market-based solutions not be relied upon as the first line resource in ensuring the public health and safety through reliable operation of critical infrastructure. The FCC must maintain continuing oversight of the use of the 800 MHz Band in order to assure it continues to be used by licensees in a manner that is consistent with the conditions upon which their licenses are granted, and in a manner that avoids infringement or interference with the rights and legitimate uses of other licenses, particularly those who play a role in the establishment, preservation and protection of public health and safety.

action which is prompted by the Petition filed by Nextel Communications' November 2001 White Paper, giving rise to this Docket.

The FCC's NPRM was published in the Federal Register on April 5, 2002 and allowed for comment within 30 days thereafter. In the limited time allowed for review of the NPRM and its consequences, the Company has included in these Initial Comments both fundamental concerns and some specific observations, but time has not allowed for a complete and thorough analysis of the NPRM and its ramifications, nor for the development of feasible and acceptable alternatives, other than those preliminary thoughts stated herein. Accordingly, the Company intends to supplement its comments, as appropriate, taking into consideration submissions filed by other interested parties in this Docket as well as other relevant factors presently under consideration as a result of the issues raised in this Docket.

### B. Accurately Depicting the Role of Electric Utilities in the Aftermath of September 11, 2002

Because of the limited discussion on this point,[10] it appears that the Commission accepts the proposition that electric utilities continue to be a part of the commercial spectrum of users in the 800 MHz Band notwithstanding the drastic changes that result from the terrorist attacks of September 11. Nothing could be farther from the truth in the current climate.

Electric utilities constitute a significant resource for government agencies concerned with public safety – in fact, the traditional partnership of government and the utility industry in the area of the protection of public health and safety is now even more compelling and a resource more than ever before to be preserved and protected, and not dismantled to enhance the commercial position of those who are the cause of the problem.[11]

We have seen as a result of September 11 that the security of utility plants – and in particular, nuclear generating stations – is a matter of heightened concern to the Federal Government, because they represent potential targets for terrorist activities. Law enforcement, military and utility personnel have stepped up their efforts to lessen the prospect of an attack and stem any further attacks that might include these essential utility facilities. Core to this activity is the ability of these groups to effectively and reliably

[10] *See*, NPRM, Para. 37, at page 22.

[11] In Footnote 94 to the NPRM, at page 22, the Commission makes note of the Petition filed in 1998 by UTC, the American Petroleum Institute and the American Association of Railroads – fully three years before the attack on the World Trade Center and the Pentagon -- and the fact that in the context of that proceeding, it rejected the notion that the power industry, among others, possessed a "quasi public safety" component. Clearly, the recent events in New York City and Washington, D.C. compel a rethinking of that position, although at this point in time, the issue should not be consideration of the transition of utilities to the 900 MHz Band, but rather their integral relationship with public safety agencies and the role they play in Homeland defense.

coordinate their routine efforts and emergency actions – including interference-free, reliable communications. Clearly, seen in this context, electric utilities are not perpetrators of the interference addressed by the NPRM; they are the victims of this increased burden and, at the same time, should be the avowed beneficiaries of any action taken by the FCC, especially considering their stepped up role and importance as part of the effort to preserve public health and safety.

### C. Compelling Critical Infrastructure to Transition to Another Band Does Not Resolve the Problem – and May Well Exacerbate It at This Time in Our Nation's History

The fact that the Commission is considering the extent to which certain incumbents in the 800 MHz Band might be reimbursed[12] for the cost they incur to transition to a new Band does not solve the problem. This is one change that money cannot fix.

Utilities and their partners in public safety presently enjoy the benefits of proven and abundantly available technology that operates to assure the reliable utilization of the 800 MHz Band. The same cannot be said for the 900 MHz Band.[13]

Therefore, and particularly at this point in time when reliable, interference-free communication is vital to our Nation's defense and security, the Commission should not be attracted to arguments that are premised on traditional notions of economic compensation to injured parties. There is a value to be ascribed to the 800 MHz Band and its reliable use by entities integral to the protection of public health and safety that cannot be "dollar-signed" away as once might have been the case, at a time when the defense and protection of the Homeland was not the compelling issue it is today.

### D. The Company's Proposal for Dealing With Interference in the 800 MHz Band

Appendix A to these Initial Comments presents Pinnacle West's proposal for dealing with interference in the 800 MHz Band. In summary, the Pinnacle West proposes that:

1. The FCC revise its regulations to tighten OOBE requirements on city floors.

2. The FCC view critical infrastructure as an integral part of the resources that preserve and protect public health and safety, particularly with respect to band allocations.

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[12] *See, e.g.*, NPRM, Para. 32, at page 20.

[13] *See* discussion in Appendix A, attached hereto, at page 21, in response to the issues raised by the FCC in Section 36 of the NPRM.

3. Bandwidth and power output levels not be mandated, but instead alternative technology fixes be employed with the understanding that interference with neighboring users will be eliminated.

4. Band allocation plans be returned to originally intended uses and that the FCC actively oversee proper utilization going forward.

5. Border uses that are licensed under foreign authority must also be licensed in the United States if they are to be used in the United States

## Conclusion

For the reasons presented in the foregoing discussion and in Appendix A, attached hereto, the Company calls upon the Commission to give careful consideration to the ramifications any restructuring of the 800 MHz band would have upon the integrated nature of its utility operations with those of public safety agencies within the service areas that its subsidiaries, APS and PWEC operate. Before implementing any plan for restructuring of the 800 MHz Band, the FCC should fully investigate all aspects of the essential nature of this relationship to the preservation of public safety by considering electric utilities to be more than just critical infrastructure but, in fact, an indispensable part of the spectrum of resources which comprise those dedicated to the protection of the public from personal injury, loss of life, property loss or damage.

If, after giving full consideration to this essential relationship in light of the tragic events September 11, the Commission believes that it is nevertheless appropriate to proceed with a restructuring that includes transition of essential users like electric utilities from the 800 MHz Band, then it should conclude that the economic, operational and technical costs of such a transition be fully borne by those who have caused the need for this transition, consistent with accepted past practice. Further, no transition should be implemented which involves electric utility users in the 800 MHz Band until the move can be made with the assurance that at least equivalent and compatible resources are fully in place. In the interim, those responsible for the interference caused to public safety resources (including utilities) should be made to implement and bear the expense of measures designed to mitigate the extent of their interference.

Thank you for this opportunity to present our views on this topic of compelling national importance. Pinnacle West would welcome the opportunity to discuss its position and recommendations with the FCC's staff in an effort to better appreciate the issues and needs for interference-free, reliable communications in the 800 MHz Band. Further, any questions on our submittal should be directed to Mr. Jeff M. Pell, IS Group Manager, at (602) 371-6363, e-mail Jeff.Pell@pinnaclewest.com, who serves a point-of-contact for the Company on matters of telecommunications.

Respectfully submitted as of this 3rd day of May, 2002.

PINNACLE WEST CAPITAL CORPORATION

BY: _____
Denny L. Brown
Vice President, Information Services & CIO

# Appendix A

## To the Initial Comments of Pinnacle West Capital Corporation in The FCC's WT Docket No. 02-55

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This Appendix contains the preliminary technical comments of Pinnacle West Capital Corporation (on its own behalf and on behalf of its subsidiaries, Arizona Public Service Company and Pinnacle West Energy Corporation) in the FCC's WT Docket No. 02-55. It covers the following topics:

- NPRM Impacts to Pinnacle West
- Pinnacle West's Proposed Plan (Response to Section 26)
- Suggestions for Border Frequency Plan (Response to Section 33)
- Interference Problems Encountered (Response to Section 19)
- NAM's Proposal (Response to Section 21)
- Interference Standards for B/ILT and Conventional SMR (Response to Section 34)
- Relocation Effects upon Existing Radio Equipment (Response to Section 36)
- Retiring versus Replacement of Equipment (Response to Section 37)
- Relocation Costs (Response to Section 38)
- "Is 800 MHz band realignment sufficient?" (Response to Section 73)
- Receiver Standards (Response to Section 74)
- Out-of-Band Emission Limits for CMRS Transmitters (Response to Section 75)
- "Would more robust levels from Public Safety signals counteract the interfering signals from CMRS digital SMR systems?" (Response to Section 76)
- "Should a maximum limit on the signal field at a specified distance from the CMRS transmitters operating in the vicinity of the 800 MHz Public Safety band be imposed?" (Response to Section 77)
- "Would a guard band provide significant interference abatement in the 800 MHz Public Safety band and, if believed to be so, what would be the recommended minimum width of an effective guard band?" (Response to Section 78)

## NPRM Impacts to Pinnacle West

Pinnacle West is significantly impacted by the 800 MHz band NPRM. Pinnacle West agrees with the need to eliminate the interference in the 800 MHz band. In its response to Section 19 on page 18, Pinnacle West identifies specific interference locations and the type of interference that it has encountered.

Pinnacle West owns and operates the following 800 MHz Critical Infrastructure Industry (CII) systems in Arizona:

- Statewide Motorola SmartZone Voice Mobile Radio System
- Palo Verde Nuclear Generating Station (PVNGS)
- Statewide Mobile Data System

These systems are described in more detail below:

### Statewide Motorola SmartZone Voice Communications System

The system is deployed throughout Arizona, from the Mexican border to the Grand Canyon and the Navajo Nation Indian Reservation. Almost all Pinnacle West sites are mountain top sites with wide-area coverage expectations, also known as "high sites".

This system is planned to grow to approximately 35 sites. Pinnacle West currently has 27 sites installed with five more sites to be constructed by the end of 2002. Additional sites will be added as needed. Pinnacle West has nearly 2000 current users of this statewide system with an additional 300 users be added within a year and several hundred more afterward.

Pinnacle West is currently discussing partnerships with some cities, towns, and Indian tribes in Arizona for support of public utilities, public works, police, and fire communications. This would provide some needed interoperability between cities, towns, and the utility in case of a disaster or need for incident support. Many of these local governments cannot afford to upgrade their aging communications infrastructure in any significant way to accomplish the seamless integration that they need. Inter-category sharing of 800 MHz spectrum and compatible equipment will be required to establish and maintain this synergy.

Preliminary estimated total value of the existing system is close to $20 Million. This figure does not include the facilities or microwave infrastructure cost. Assuming that there is a new technology and viable available frequencies, replacement cost for this system could double that cost to $40 Million if the new technology requires additional site locations to achieve the same coverage area.

## Palo Verde Nuclear Generating Station (PVNGS)

This electric generating station, located approximately 50 miles west of downtown Phoenix, is the largest nuclear plant in the United States. The plant produced 28.8 billion kilowatt-hours of electricity in 2001, more than any other power producer in the United States. Voice communications at Palo Verde consist of an 800 MHz Motorola SmartNet trunked system that has been operational since July 1995.

Total cost of implementing this system at PVNGS was $10Million. Replacement cost would be much higher as the technology and frequencies used will have to meet stringent requirements. Certification of a replacement communication system must undergo a time consuming and costly Nuclear Regulatory Commission (NRC) engineering design review process.

## Statewide Mobile Data System

Pinnacle West and APS are in the implementation stages of a statewide 26-site 19.2 KBps mobile data system upgrade in the 800 MHz band. The Companies currently have a three-site Phoenix Metro area mobile data system in operation and frequencies licensed throughout the state.

The preliminary cost of this system is expected to be approximately $7 Million.

## The Pinnacle West Proposed Plan (Response to Section 26)

The Pinnacle West proposed plan covers both solutions to the near term situation and long-term situation.

## Near Term Plan

From Pinnacle West's perspective, the only feasible, equitable and economic thing that can be done in a timely manner to remedy the current state is to clean up the interference from the offending sites on city floor low sites. Moving any group of users from the band will be logistically difficult and inequitable under the circumstances.

The 800 MHz band is being used in a fashion different that originally conceived. The big change in the landscape is that there are now transmitters licensed on the city floor where in the past there were only mobiles and portables.

It is now obvious that Out-Of-Band Emission (OOBE) specifications for high sites are insufficient when applied to low sites. At high sites, there are no neighborhoods, businesses, or schools within 1/3 of a mile to interfere with fire, police, and utility worker communications.

With the exception of the interference created around these city floor cell sites, the 800 MHz standard band plan works well for Pinnacle West and APS. APS is using the band plan as intended, including the interleaved portion (854.75 - 861 areas) of the band plan.

At low sites, the use of noisy Commercial Mobile Radio Service (CMRS) technology robs spectrum from all users around the CMRS site.

To solve this problem, Pinnacle West recommends the elimination of the interfering OOBE transmissions at these sites. The only other option is the creation of a site a third of a mile in diameter with a fence around it. Obviously, this second option would be impracticable to implement.

***Recommendation***

Pinnacle West recommends that the FCC revise the regulations to tighten the OOBE requirements on city floor sites.

Pinnacle West also recommends a tight OOBE standard that seeks to address both the adjacent channel emissions and the broad band noise emissions at low sites. This standard is the one being discussed for application by the Telecommunication Industry Association Private Radio Section (TIA PRS) on the 700 MHz band (91+log(P)dB) adjacent channel, with a broad band noise component of less than –110 dB no more than two channels away. Variables such as tower height and size of the site can be considered by applying this standard at the fence line of the low site or 100 feet from the tower. The new specifications can be accomplished with today's technology by a combination of high quality amplifiers, clean combiners, and lowering transmit ERP to a level of about 10 to 15 watts. (See our response to sections 73 – 78 starting on page 22 for specifics).

Two low site standards may be required: 1) For low sites using frequencies in the interleaved portion of the band (855-861) these low power and tight standards should apply; 2) For low sites that only use frequencies in the bands that are primarily SMR (851-854, 861-866, 869-+) the OOBE standard could be applied at the edge of the SMR band.

Implementation is to be accomplished by FCC order with cost to be borne by the site on the city floor. Many sites on the city floors may be affected. Although Nextel's standard implementation is a definite offender, Pinnacle West has monitored other CMRS sites with carrier frequencies above 869 MHz that emit significant broad band emissions that span 12 MHz into the NPSPAC band.

The definition of a 'low site' will have to be tied down. Obviously, if it is likely that a Public Safety entity or critical infrastructure industries, including electric utilities, would need to communicate at or near the fence of this site it should be considered a 'low site'. Specification in terms of population density or vehicular traffic density near this site should be used. Using telecommunications parameters, such as tower height, number of repeaters and so forth, may leave loopholes that might allow problem sites to skirt the new standards.

Pinnacle West recommends this plan because:

1) This change is needed regardless of any band plan rearrangement. The solution should not be technology-dependent or use-dependent, but instead promote non-interference between radio frequency neighbors as new technology is implemented.

2) Overall, although the cost of high quality amplifiers, band pass filters, lowering ERP and cavity combiners is not cheap, that cost is far less than the cost of rebuilding the entire 800 MHz band infrastructure.

3) This plan is consistent with the original intent of the rules for the 800 MHz band spectrum – to protect multiple users of the band using the high site model.

4) This is the least disruptive solution with the lowest impact to the greatest number of users.

5) New OOBE limits need to be imposed immediately to CMRS digital SMR transmitters now operational in the field. It will take several years to address new band reorganization for the 800 MHz spectrum and relief is required now.

The only other near term alternative is the less feasible option of turning down or removing the offending CMRS technology at low sites from the interleaved portion (854.75 - 861 area) of the band plan. When faced with the alternative to clean up or get out, the choice will be on the shoulders of the interfering agent. Both choices will fix the interference problem with Public Safety and CII.

## Long Term Plan

The long-term plan includes:

- Public Safety and CII synergy
- Changing Technology Challenge
- Comments on Rebanding
- Maintaining Channel Allocation Integrity
- Appropriate Compensation to Injured Parties
- Trust in Technology

## Public Safety and CII Synergy

At some point, a reallocation of the band will become necessary so that band-pass filtering could be used effectively in the mobile and portables. When this occurs, the concept of a category for CII must be considered in any long range planning for the communications needs of this country. Placed upon this category are essentially the same requirements for reliability, coverage, and equipment as Public Safety. Indeed, the equipment sold to electric utilities for voice communications is identical to that sold to Public Safety entities.

Pinnacle West advocates that the CII allocation continues to be intermixed with Public Safety. Specifically, CII allocation should remain in the interleaved portion of the 800 MHz band along with Public Safety, additionally receiving an allocation in or near the 700 MHz band is warranted. In this way, the existing synergy between CII and Public Safety can be maintained.

There is a synergy between utilities and Public Safety in these essential areas:

**Public service obligation:**
APS is a certificated entity that provides electricity in defined service areas within Arizona. It is obligated to plan and provide for the actual and anticipated needs of its electricity customers in these territories. The essence of this obligation is reliability. Many of the users of our energy directly and indirectly support or coincide with the objectives of Public Safety (*e.g.,* energy for essential services, like fire or police, hospitals, traffic control, etc.)

**Equipment:**
The shared use of the same equipment by both CII and Public Safety customers helps keep the product costs down. Often the utilities have more funds to purchase modern communications equipment and actually help support the development of new products that ultimately are used by Public Safety.

**Coverage areas:**
Many utility companies have the same coverage needs as Public Safety entities, APS requires virtually a statewide system that is only rivaled by the Arizona Highway Patrol (Arizona Department of Public Safety) in terms of coverage.

**Shared infrastructure:**
In many cases, APS and other utilities have shared their infrastructure with public entities that required a more robust system than they could implement.

If this synergy is not available in the future due to diverse allocations of spectrum, the implementation cost will increase for everyone including Public Safety, CII, and equipment vendors. In addition, the possibility of sharing infrastructure and interoperability is eliminated.

***Recommendation***

Pinnacle West strongly recommends that CII be considered an integral partner with Public Safety systems in any band plan reallocation.

The only thing certain about technology is that it will change. The regulating bodies attempt to anticipate this need for change. For the Public Safety sector, it gets half of the 700 MHz band. Vendors are already developing equipment for this band. CII also needs a future home allocation; therefore, Pinnacle West recommends that CII/utility share the same spectrum allocation as Public Safety.

## Comments on Rebanding

*Changing Technology Challenge*

One of the side effects of digital technology is that as more sites are required to cover the same area, the greater number of transmitters creates a higher noise floor. This requires more sites, thus elevating the noise floor still more, forming a vicious circle. From a noise perspective, it would be desirable to limit the number of sites. The function and spectrum utilization might be better served with high site wide band channels at fewer sites or separating the band to provide a region that is primarily used for high site technology.

***Recommendation***

Pinnacle West recommends that bandwidth and power outputs levels not be mandated. Instead, the certification of new technology emission templates, the requiring of automatic transmit power level reduction features to match the mobile or portable, and requiring of tight OOBE restrictions is recommended. With the understanding that no matter what technology is used, it will not affect adjacent channel neighbors or nearby geographic neighbors.

*The Right Channel Mix*

APS uses several channels at each of its sites. Optimally the channels should be separated by 1 MHz to provide low losses and clean results from the combiners. The existing interleaved plan works well for this scheme; a compressed plan would not. A minimum span of 5 MHz is required; however, for a 10-channel site the best spacing that could be obtained would be 1/2 MHz. Any smaller spacing introduces incremental losses and the reduction in coverage. In the future, it may be advantageous to aggregate contiguous channels to provide for functions such as high-speed mobile data. Therefore, the right allocations that provide both spaced and contiguous channels are important.

## Maintaining Channel Allocation Integrity

Another area that must be curtailed is the continued acquisition of spectrum from all classifications being converted for use as CMRS. This conversion distorts the intent and the process of the band plan to a point in which it cannot be depended on. The 800 MHz spectrum has been acquired in all major areas. If a utility was at this time faced with converting from a VHF or UHF system, the utility would find no frequencies available. Spectrum in some cases has been acquired just for the sake of acquisition. Some may say the spectrum is a commodity that should be bought and sold on the free market. However, spectrum is in reality a critically important natural resource that must be used and managed wisely in the interest of the public good and society as a whole.

It is wise planning to allocate resources for specific users. This planning allows technology to be developed that meets society's needs so that the investment by both vendors and operators can provide the intended benefit to society. Obviously, in terms of dollars some uses of spectrum turn a profit sooner than others; however, the benefits to society must be measured in more than mere dollars.

***Recommendation***

Pinnacle West recommends returning band plan allocations to their original uses and the consistent and active oversight and enforcement of this usage by the FCC. Specialized Mobile Radio (SMR) use of Industrial/Land Transmission (ILT) radio, Business Radio (BR), and Public Safety frequencies should not be allowed in the 800 MHz interleaved portion of the band. Nextel's continued purchasing of ILT and BR channels should be immediately stopped. If at some point the allocation is being under utilized with no likely prospect of efficient use, it will then be obvious to the regulating bodies and may be distributed to worthy entities.

## Appropriate Compensation for Injured Parties

Consistent with its recommendation that the FCC actively oversee proper use of the 800 MHz band, comes the recommendation that it also provide for reasonable compensation to users that are harmed by inappropriate use. This measure constitutes an effective deterrent to misuse. Further, if valid, non-interfering users are forced to move, they should bee fully compensated for the expenses incurred in the move

## Trust in Technology

Technology has and will come to our rescue. Pinnacle West has monitored recently installed sites on the Phoenix city floor that do not have any broad band emissions over – 110 dB and have a no OOBE on adjacent channels. These CMRS sites prove that with the proper use of new technology to prevent interference the new technology can co-exist with vintage technologies and thus allow an orderly migration into the future.

## Suggestions for Border Frequency Plan (Response to Section 33)

If band-plan reorganization is to be undertaken, the 800 MHz Mexican border frequency plan should also be reworked to eliminate the conflicts found in the current plan. The APS statewide trunked radio system is one of the few 800 MHz band systems that uses both the regular channel plan and the Mexican border channel plans. We have extensive experience dealing with this plan. APS has five sites in the border zone and 28 sites north of the zone. Sixteen sites have coverage areas that include the zone area or are affected by sites within the zone.

It is understood that an international agreement is required to change the plan. When and if it takes place, Pinnacle West recommends that the plan be simplified by extending the regular plan to the border, with reasonable restrictions on across-the-border emissions. Use of directional antennas may be necessary to direct emissions away from the border. Some bandwidth would be allocated for joint use in government, Public Safety and CII. However, ILT, BR, or SMR applications which need overlapping border emissions would require a wavier and coordination with Mexico.

The current use of offset channels and band plan allocations that are in direct conflict with the regular channel plan allocations causes much more interference and confusion than any interference that has been experienced from Mexico. For APS, the mixed use of these plans does not provide seamless functionality as normally expected with the Motorola SmartZone trunked radio technology. It cannot do site to site handoff of mobile units as originally intended when there is a change in band plans between sites.

***Recommendation***

If a Mexican channel is used on US soil then it must be licensed in the US and abide by US rules, regardless of channel swap agreements made with Mexican entities. For example:

- APS has discovered the use of Mexican channels in use on US soil while investigating an interference case in Yuma, Arizona. Upon investigation, it was determined that a prominent CMRS operator entered into an agreement with its own Mexican entity for use of these Mexican channels. The use of these channels on US soil adjacent to APS's ILT channels was found due to the sudden loss of coverage at the APS Yuma Service Center. The problem was caused when APS's trunked system was overpowered by OOBE on corresponding adjacent Mexican channels from a low-level site 1/3-mile away from the APS Service Center.

  There was no US license for use of these channels, apparently a gray area in the rules regarding the use of Mexican frequencies by equipment on US soil. This required APS to track the interference by monitoring the frequencies, locating the source, and finding the owner via other frequencies that were licensed to that site. The CMRS operator did cooperate and moved their channels away from APS's in this case. However, there appears to be no otherwise enforceable recourse through the official rules.

  This is possibly a use of border channels that was not intended by the Mexican 800 MHz band plan. If allowed to continue, these channels could be used as far north as Tucson where the 70-mile border zone ends. A feature of the 800 MHz Mexican border plan is that part of the plan (from 861 to 866) alternates channels with Mexico. Use of these alternating channels in the US will cause havoc in the 800 MHz band, as they will be immediately adjacent to all user groups in this part of band. There are (30) Public Safety channels, (20) ILT channels, (30) SMR, and (20) BR channels in this portion of the border plan.

- The 800 MHz border channel plan has a 12.5 KHz offset requirement and uses allocations that conflict with the regular plan. This causes significant problems. At two of APS's sites near the 70-mile border zone edge, the licenses of its Mexican border zone channels have been compromised by licensees for regular channels just beyond the 70-mile border zone limit. In these cases, the Mexican plan allocates ILT channels just 12.5 KHz from SMR channels in the regular plan. Similarly, APS has two sites with ILT channels on the regular plan that have been compromised with SMR licensees on the Mexican plan.

  Discussions are underway with the holder of the SMR licenses for several months, to try to resolve the licensing conflict, but with no success to-date. There needs to be some incentive created to achieve this and an easier, more responsive way to resolve the situation. The net effect of the Mexican border plan is to impact over half the spectrum for up to 140 miles north of the border. Frequency coordinators have to be very aware of border offset channel issues when issuing licenses as far north as 140 miles from the Mexican border.

- An ultimate solution can be achieved when Mexican authority can reliability coordinate and enforce the proper use of 800 spectrum on the Mexican side of the border. Until that time, no border plan, no matter how well thought-out, can guarantee a clean spectrum near the border.

- Practically speaking APS has not had any 800 interference from Mexico other than the previously mentioned CMRS operator. This may change if 800 MHz equipment becomes readily available at reasonable prices. Then APS may begin to experience uncontrollable interference like that which has been seen on the VHF band. Currently, the VHF interference is manageable in that it is limited to border communities in which the users understand the problem and have alternate channels to complete the needed communications.

**Interference Problems Encountered (Response to Section 19)**

Pinnacle West has and is experiencing several of the typical interference issues with Nextel. For example:

- Receiver front end overload near low-level city sites and adjacent channel interference.

  In the Phoenix Metro area, when an APS vehicle gets within 300 feet of a city-floor-based Nextel site where their frequencies are within a few hundred KHz of APS channels, the APS radios do not function reliably. APS channels immediately adjacent to active Nextel channels will not work, regardless of APS signal strength in these areas. The Nextel cell site ERP is typically licensed for 1000W per channel in Phoenix. If they were to truly radiate this much power, it would render APS's system useless in Phoenix.

- Co-channel interference is experienced with Nextel.

  This has occurred when Nextel has bought-out former ILT channel users and then used those channels as SMR channels throughout the area. Nextel has several ILT channels in the Phoenix area, nine of which are co-channel to those APS has in areas surrounding Phoenix. Nextel's practice of propagating these channels to sites just outside of the 55-mile short-spaced limit significantly impacts the viability and reliability of APS's channels.

**Detailed Analysis**

Pinnacle West's critical infrastructure 800 MHz analog radio communications has been subjected on occasion in the Phoenix Arizona metropolitan area by Nextel low-site digital SMR stations (Motorola Integrated Digital Enhanced Network (IDEN) technology). This has occurred in the vicinity of at least five locations in metro Phoenix and one recent occurrence in Yuma Arizona.

The interference has manifested itself as:

- receiver front-end overload/desense with resultant intermodulation where a marginal Carrier to Interference Ratio (C/IR) has blocked reception from our high site locations

- co-channel interference where Nextel intentionally has ceased operation of its transmitters on the Pinnacle West control channel (which operates on a continuous duty basis) contrary to Pinnacle West documented wishes. This provides a false assumption by the mobile radio that since the control channel has no interference, the voice channels will also be interference-free.

  This latter interference condition is due to co-channel and overlapped coverage between the Pinnacle West noise limited system and the Nextel interference limited system. It manifests through the Pinnacle West mobile unit "thinking" that the remote mountaintop site is the best choice for coverage at a given location due to no interference being received on the control channel. However, after voice channel grant is given, the co-channel continuous duty Nextel transmitter blocks reception to the mobile unit and the mobile unit receives only noise from the Nextel site.

- Pinnacle West believes that Nextel's activities do not comply with FCC's regulatory requirements at Section 90.693, by short spacing the 70-mile co-channel limit from a Pinnacle West site with ground-level sites that encroach on the same Pinnacle West service territory for its primary electric distribution operations.

- See Pinnacle West's response to Section 33 on page 16 for information about the Mexican border interference.

## Nextel's Proposal (Response to Section 23)

Pinnacle West considers the Nextel proposal an impracticable implementation. While the frequency shuffle is commendable, ILT utility users ***must*** be considered as critical users of this spectrum. Pinnacle West's power system infrastructure is vital to the safety of this country and our employees. We previously migrated at great expense from VHF systems where interference and increasing regulatory constraints finally got the upper hand. We have migrated to 800 MHz to be relieved from this only to find a new interference source. Most mountaintop associations in Arizona require the use of pre-selector cavity filter technology to prevent the spread of intermodulation and spurious emissions. Nextel does not typically comply with these requirements.

Nextel's proposal to move ILT users such as Pinnacle West to 900 MHz or 700 MHz is not viable. These bands do not provide the licensable bandwidth for us to conduct our business. The reliability of an interference-prone guard band is not acceptable for our application. Newer digital technology is unproven for coverage similarity to analog systems. Pinnacle West expects a range reduction that could approach 30% which translates to adding additional sites – new sites that would incur the added cost for facilities and back-haul infrastructure.

Nextel's proposal does not consider relocation costs for the ILT/Business users. The replacement cost impact on the infrastructure the size that Pinnacle West has would be in today's dollars approximately $50-75M, assuming technology and frequencies are available. If the FCC were to consider utilities such as APS to be a similar classification to Public Safety, the continued use of 800 MHz spectrum as equals (not secondary status) would be viable.

## NAM's Proposal (Response to Section 21)

The National Association of Manufacturers (NAM) proposal presents a problem that is unacceptable, as it compresses ILT 800 MHz users to a guard band status. The reliability of an interference-prone guard band is not acceptable for Pinnacle West's application. APS uses several channels at each of its sites. Optimally the channels should be separated by 1 MHz to provide low losses and clean results from the combiners. The existing interleaved plan works well for this scheme; a compressed plan would not. A minimum of a span of 5 MHz is required, so for a 10-channel site the best spacing that could be obtained would be 1/2 MHz. Any smaller spacing introduces additional incremental losses.

## Interference Standards for B/ILT and Conventional SMR (Response to Section 34)

### Current Guidelines

In Arizona, traditionally, new system operators seeking operational status and concurrence that their systems do no harm to existing systems follow technical guidelines and notification processes set forth by high-site (mountaintop) user associations. These technical guidelines typically exceed manufacturer spurious emission specifications.

The strict adherence to CFR 90.173(b) is typically followed with enforcement of the technical guidelines by the Bureau of Land Management (BLM) or United States Forest Service (USFS) where necessary as a condition to their lease agreement. As a side note, the typical major metropolitan city has no technical guidelines addressing Radio Frequency Interference (RFI) with the proliferation of low site CMRS systems in their jurisdiction. The requirements for interference mitigation are not addressed nor is the typical easement/right-of-way technically approved by city telecommunications engineering staff. The City of Phoenix is a clear example of the above.

In the various publications about interference mitigation, there is discussion regarding the height of the tower structures being a crucial factor to mitigate the high Effective Radiated Power (ERP) levels caused by CMRS ground level sites. Many, if not all, cities are sensitive to the aesthetic appearance of these sites and will not allow tower height necessary to address this issue. If we are serious about rectifying this RFI, it will require an FCC override regarding city ordinances with tower height restrictions.

## Critical Infrastructure Industry Issues

CII bandwidth, such as the Pinnacle West 800 MHz trunked radio system, is necessary for the safety of both the public and the employees of CII operations. For the public and the CII employees, secondary status is a precarious position. However, well-designed networks could be coordinated and would have no adverse consequence to Public Safety systems. CII systems typically use the same type of equipment and have the same wide area coverage expectations as Public Safety systems.

Pinnacle West operates a three-unit nuclear power plant within 60 miles of a major metropolitan area that requires emergency radio communications in various forms to be available in a crisis. APS has partnered with the Arizona Radiation Regulatory Agency to provide radio coverage throughout the metro Phoenix area and within the 10-mile Emergency Planning Zone (EPZ) using the APS 800 MHz trunked radio system during crisis events.

Interoperability and infrastructure cost sharing between Public Safety and CII is a definite desirable aspect today since the events of September 11, 2001 and with the high capital cost of radio equipment. Allowing inter-category sharing of frequency pools by Public Safety and CII where it is in the interest of both parties is becoming more of a necessity.

## Relocation Effects upon Existing Radio Equipment (Response to Section 36)

The equipment owned by Pinnacle West cannot be relocated into either the 700 MHz or 900 MHz bands without replacement. The infrastructure equipment or the mobile have typically band-limited radio frequency filters in various forms. In addition, transmitter combiners, receiver tower top amplifiers, multicouplers, and antennas (base and mobile) in association with the radios themselves are band-limited.

### Retiring versus Replace of Equipment (Response to Section 37)

Pinnacle West urges not to move CII from the 800 MHz band based upon the crucial nature of CII operations and the extent of their potential ability to share infrastructure with Public Safety to the benefit of the public in general. Pinnacle West cannot afford to move to another band without total replacement of spectrum (bandwidth for bandwidth) and total financial reimbursement.

### Relocation Costs (Response to Section 38)

Spectrum consolidation, while good for isolating Public Safety from CMRS interference, presents new problems for Public Safety and CII. The condensed nature of the spectrum use that the Nextel or NAM proposals represent brings risk of more transmitter intermodulation (IM) to these systems.

The current band plan with interspersed channels allows for minimum losses in transmitter combining equipment where typical channel spacing is 1 MHz. The proposed plan will introduce tighter channel spacing (down to as low as 150 KHz) with higher losses (up to 3 dB more) and subsequent lower ERP. However, on the positive side, this consolidation opens up possibilities for next generation systems to provide for Public Safety and CII bandwidth requirements for the mobile computing environment.

### "Is 800 MHz band realignment sufficient?" (Response to Section 73)

The various band realignment proposals will provide the isolation needed from the CMRS digital SMR infrastructure to Public Safety. However, if CII systems are to occupy the "buffer zone" between Public Safety and CMRS, the realignment will offer little or no isolation to CII systems from low-site CMRS digital SMR signals. For transmit filtering to work, at least 5 MHz separation is required before it provides any appreciable attenuation of unwanted transmitter noise.

***Recommendation***

Because of the Pinnacle West experience with the interference from Nextel transmitters, the following recommendations in addition to band realignment:

- Improve transmitter spurious emissions specifications for CMRS digital SMR systems to something close to that which TIA PRS has proposed for the 764-776 MHz band. This reduces OOBE to levels dictated by 91 + Log(P) dB.

- Eliminate hybrid combiners and replace them with tuned cavity combiners, which will greatly enhance spurious OOBE noise roll off from the center frequency of their transmitted carrier.

While this may remove the CMRS operator's ability to be frequency agile, this is a good thing. If frequency coordination minimizes interference at a particular low-level CMRS site to Public Safety and CII systems, the CMRS operator should not be moving those frequencies around in the city on a day-to-day basis. Bandpass filtering will also reduce in-band intermodulation products created by their transmitters. Spurious emissions must be stopped at the source if there is expected to be any solution. Once these unwanted emissions are released into the airwaves, you can no longer control them efficiently.

- Use balanced coverage model.

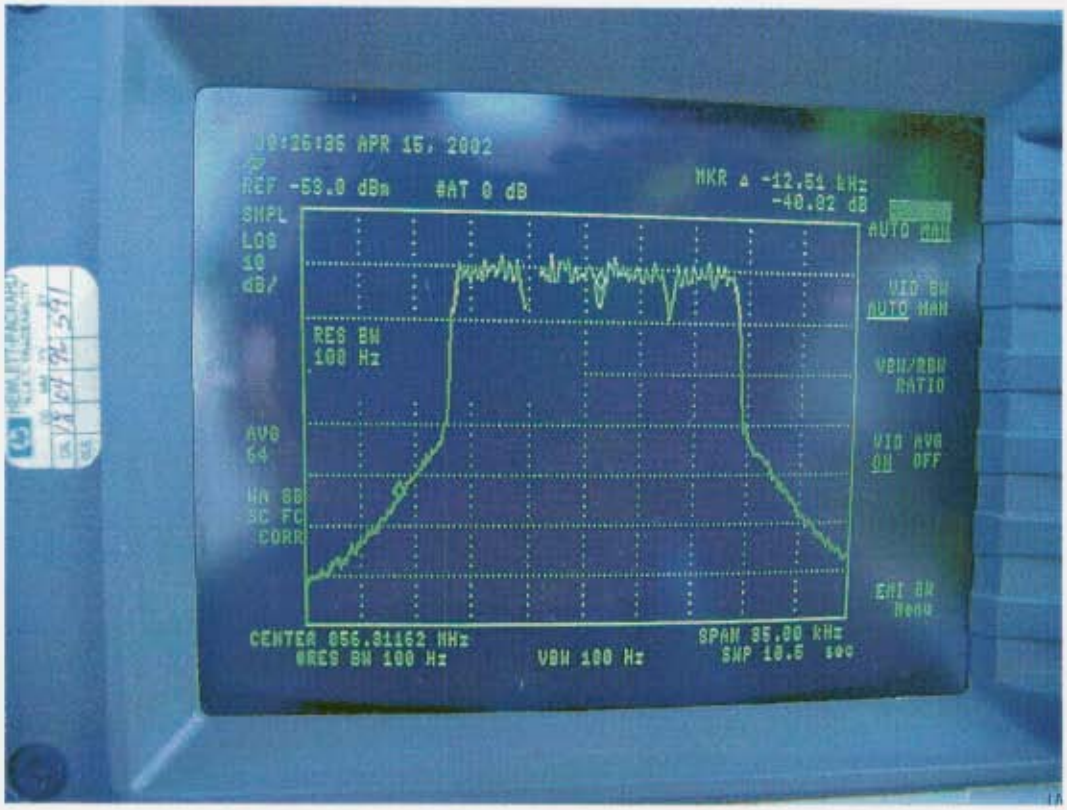
  By balancing the power of the base transmitter talkout coverage to match the subscriber talkback coverage, reduced ERP can be afforded at the base transmitter and still match the limited subscriber coverage distance. This reduced ERP, in conjunction with possibly higher physical antenna placement and/or lower antenna gain, will reduce the low site IDEN base station interference to Public Safety and CII systems to a level that may be tolerated.

- The *Best Practices Guide* (as referenced in FCC 02-55) asserts that an additional degree of interference protection can be afforded if "more interference resistant Public Safety handheld and mobile receiver units were deployed". While this assertion has merit, it is not practical considering the quantity of deployed units today. We cannot expect every Public Safety and CII system operator today to run out and purchase new equipment to solve this interference problem. Instead, Nextel should be held accountable to resolve all interference complaints in a timely and effective manner by using sound engineering practices that reduce or eliminate side band noise to a tolerable level for the interference recipient.

## Examples of Clean Spurious Noise Emissions

As an example of the differences between deployed technologies, we submit some pictures of actual transmitter spectrum noise that show that it is possible to have exceptionally clean spurious noise emissions.

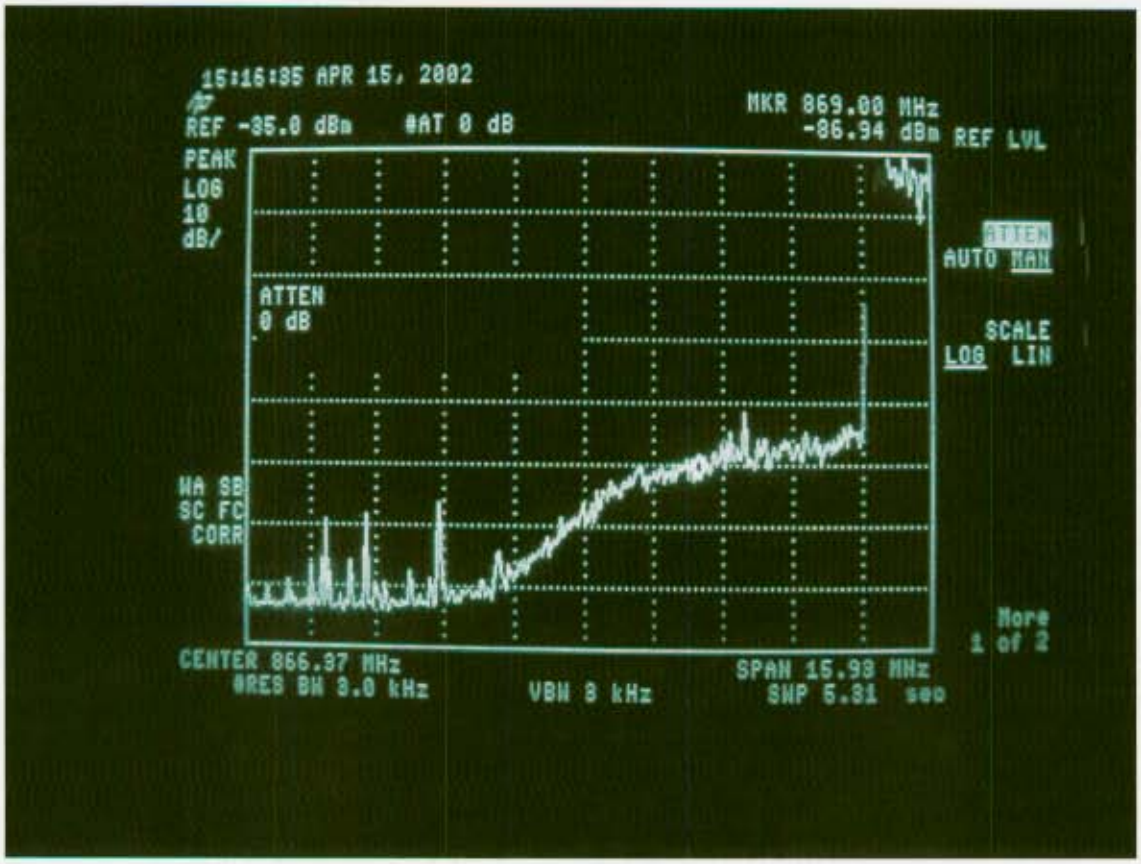
## Example of an IDEN Transmitter




Here it is shown that the noise power of this transmitter is only down 43 dB from the main carrier at the 25 KHz channel edge. Referring to the *Motorola EBTS System Manual* (68P80801E35-A, 9/1/2001) Volume 2, Figure 3 on page 14 suggests that this transmitter is out of specifications by at least 10 dB. The reason for this is unknown by PNW / APS. However, PNW / APS visited three sites in metro Phoenix and found all of them to be similar. Adjacent channel noise power was down to –63 dBc at its center.

## Example of an CMRS CDMA Site

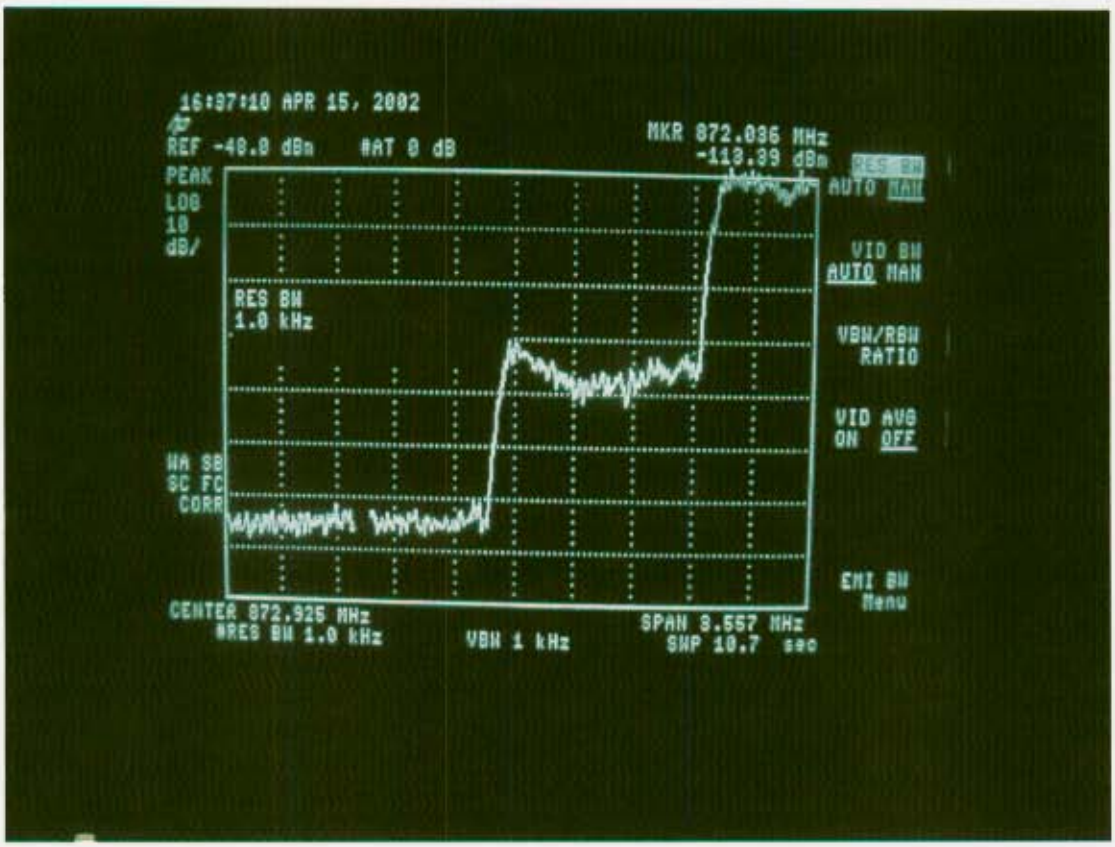
For a CMRS CDMA site, here is an example of a dirty transmitter causing a least 20 dB of radiated energy (above the noise floor) within the NPSPAC band:




This site used an after market external third-party broadband amplifier system using hybrid combiners and a "Metawave" steerable antenna array.

## Example of a Clean CDMA Site

The following picture shows how clean a CDMA system can be using fixed tuned Bandpass filters and OEM amplifiers:




The noise floor is about –112 dBm at 175 KHz adjacent to the CDMA carrier. The channel #2 carrier (rightmost) sideband noise is attenuated by at least 60 dB at this point. Notice the fact that the transmitted energy falls off rapidly at a steady rate and we cannot get detectable noise power beyond this point.

## Receiver Standards (Response to Section 74)

Over the years, technology has gone towards software solutions for RF systems to trim the size and weight of mobile and portable radio equipment and make them frequency agile. While pursuing these solutions, RF equipment manufacturers mainly tried to reduce manufacturing costs and eliminated as much mechanics (e.g., tuned preselectors) as possible. This is because Public Safety and private radio systems are not consumer products. These systems cannot create the volume of sales necessary to support profitable prices; instead manufacturing costs must be driven down.

It has been discussed in the Association of Public Safety Communication Officers ("**APCO**") Project 39 reports that receiver performance for handheld radios cannot be significantly improved without compromise in overall performance. PNW / APS concurs in that assessment. However, mobile units do not have the same limitations. A common receiver standard for handheld portable radios should not be incorporated into the Commission Rules; rather, an industry standard promulgated by ANSI would suffice. The Public Safety market place is currently being driven by the upcoming Project 25 specifications. This specification for receivers should be enhanced to cover these issues.

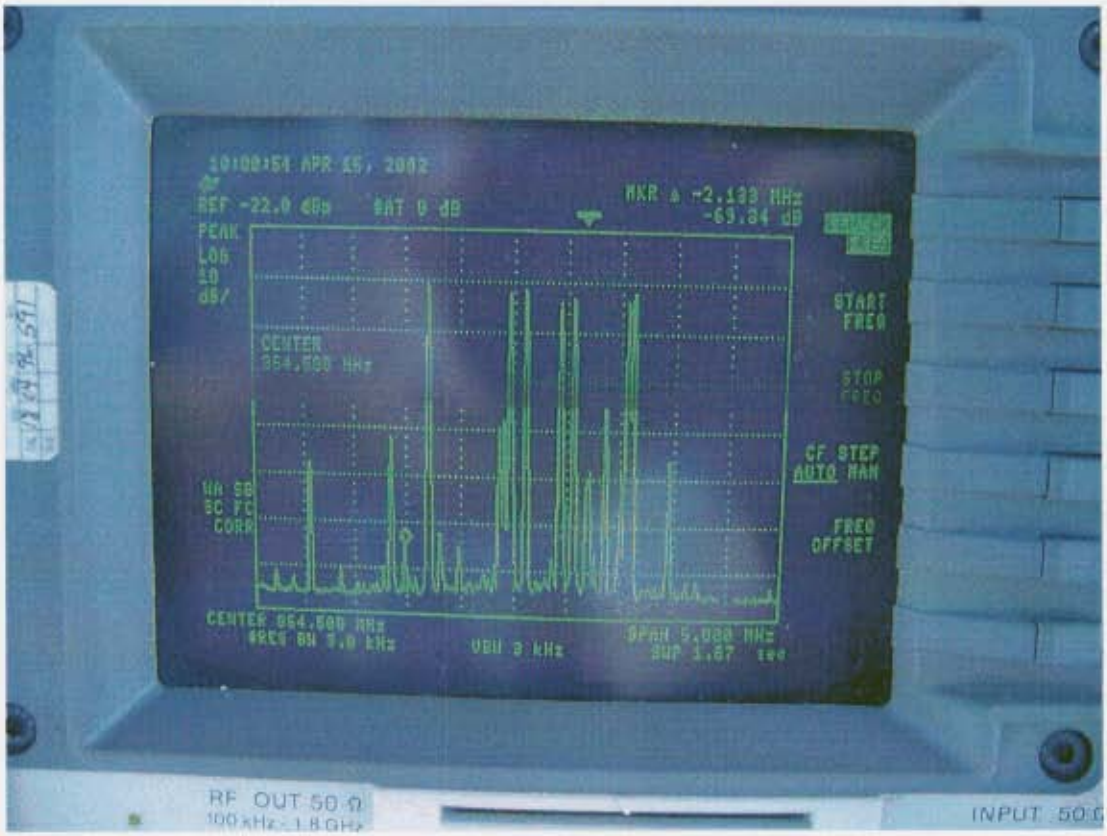
## Out-of-Band Emission Limits for CMRS Transmitters (Response to Section 75)

Pinnacle West believes that the current OOBE limits for CMRS transmitters are not stringent enough for adjacent channel use by Public Safety and CII systems. Receiver front-end noise overload will continue to be problematic. The level to which CMRS transmitter OOBE should be controlled should be increased at least 20 dB to attain OOBE levels down into the –80dBc range at 25 KHz removed from the center of the transmitter frequency.

As discussed in paragraph 73 on page 22, Nextel transmitters do not have sufficient roll off, due to their deployed configuration using hybrid combiners, to suppress their spurious emissions beyond their assigned frequency. If the corollary were true whereby Public Safety and/or CII systems employed similar low site systems, these systems would interfere with Nextel and other CMRS subscriber units to the same extent. This happens when dropped calls occur without warning to the cellular subscriber. Because of the intermittent nature of typical Public Safety and CII systems and the relatively low density of deployed low level Public Safety and CII systems, this issue has not been documented to a sufficient extent.

## Example of Typical Nextel Transmitter

As an example of OOBE interference, Pinnacle West measured a typical Nextel transmitter at a level of –32dBm at a distance of approximately 250 feet. There were seven channels at the same relative power level. The composite average power equates to a level of –23.5 dBm across the band. See the following spectrum analyzer photo:



If the transmitter noise were suppressed to –80dBc at 25 KHz, then for a portable handheld receiver operating two channels removed from the Nextel transmitter at a distance of 100 feet, you would have the following conditions:

| | |
|---|---|
| Transmitter ERP(7W w/10dBd Ant): | +48 dBm |
| Transmitter Noise @ 2 Ch's removed: | -80 dBc |
| Free space loss @ 100 ft: | -53 dB |
| Resultant Receiver Front-end Noise: | -85 dBm |
| Isolation required for no Rx desense (min): | -33 dB |
| | –118 dBm receiver threshold sensitivity |

The 33dB isolation required to mitigate the noise power could be obtained by adjusting antenna gain/height and/or transmitter ERP. For the transmitter power, it would be suppressed to

| | |
|---|---|
| Transmitter ERP: | +48 dBm |
| Free Space Loss: | -53 dB |
| Receiver Antenna Gain: | -6 dBi |
| Receiver Adj. Ch. Rejection: | -75 dB |
| Resultant Transmitter Level @ Rx: | -86 dBm |
| Typical Signal Strength @ Rx: | -90 dBm[1] |
| Resultant C/I Ratio: | 4 dB offending signal |

With a C/I ratio of 4 dB, an additional 20 dB of Receive signal or 20 dB reduction of transmitter ERP would typically be required to capture this interference. Again, adjusting antenna gain/height and/or transmitter ERP plus what ever transmit filter (notch filter) could be applied to protect the receiver channel from overload would be necessary.

To consider an average composite power, add 8.5 dB to the Transmitter ERP. Having an aggregate composite level suppressed sufficiently would require band separation between the receiver and transmitters. Interspersed adjacent channel use between CMRS digital SMR and Public Safety/CII systems cannot be made to work satisfactorily at close in ranges such as in this example. If the transmitter ERP could be reduced by at least a factor of 20 dB by balancing talkout with subscriber talkback, this would counteract the negative effect of composite transmit signals being located at a low-level site.

Pinnacle West also recommends new OOBE limits be imposed immediately to CMRS digital SMR transmitters now operational in the field. Additionally, balancing talkout distance from a low-level cell site with talkback distance of CMRS digital SMR subscriber units will further alleviate interference. It will take several years to address new band reorganization for the 800 MHz spectrum and relief is required now.

[1] This is approximately a 28 dB SNR under normal conditions. It is a typical signal level with partial terrain/building blockage (15-30dB) in most urban areas from mountaintop locations 35 miles distant (-122dB path loss) from a transmitter ERP of 180 watts (+53dBm).

**"Would more robust levels from Public Safety signals counteract the interfering signals from CMRS digital SMR systems?" (Response to Section 76)**

If Public Safety signal levels were more robust, they might counteract the interfering signals. However, if the 800 MHz band is restructured to consolidate spectrum use by Public Safety and CII systems, then the negative factor of transmitter combining losses will go up proportionately. This would counteract any modest attempts to raise antenna gain and/or power output levels reasonably.

Most base station transmitters today are limited to a maximum output power of 100 watts. Antenna gains beyond 6 dBd typically start having vertical beam width limitations that are less than 16 degrees. This is not a problem for high sites that have less than 2000 feet HAAT. Downtilt and higher gain antennas will help if tower space allows. Typically, the amount of additional signal strength required to overcome the CMRS digital SMR interference is on the order of 20-30 dB. This is well beyond the reasonable capacity of the Public Safety/CII transmitter stations today to achieve.

**"Should a maximum limit on the signal field at a specified distance from the CMRS transmitters operating in the vicinity of the 800 MHz Public Safety band be imposed?" (Response to Section 77)**

A maximum limit on the signal field at a specified distance from the CMRS transmitters operating close to the Public Safety 800 MHz band should be imposed in the composite sense. For every 6dB of composite signal increase, the interfering circle distance from the low-level site will double. Therefore, there should be an aggregate limit set for a high-density low-level site. In conjunction with this limit, antenna height and ERP play an important aspect to this managed configuration. The Commission should be prepared to deal with city zoning ordinance restrictions that would possibly prevent the proper application of this antenna height solution.

**"Would a guard band provide significant interference abatement in the 800 MHz Public Safety band and, if believed to be so, what would be the recommended minimum width of an effective guard band?" (Response to Section 78)**

Pinnacle West believes that an effective guard band between CMRS digital SMR technology and Public Safety/CII systems is required before low-site CMRS systems can coexist with high-site Public Safety/CII systems. The basic incompatibility is high-site versus low-site deployment. If the guard band is at least 5 MHz wide, then the filter technology would be available and can be deployed on CMRS systems to protect the Public Safety/CII receivers from desense. Receiver front-end overload must be managed by transmitter to receiver isolation. In conjunction with the guard band, if the restructured 800 MHz band were consolidated so that specific blocks eliminate interspersed incompatible uses, then the receiver technology might have the breathing room to accommodate tighter front-end selectivity which would deal with the receiver front-end overload.