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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

**PUBLIC SAFETY RADIO  
COMMUNICATIONS PLAN  
FOR  
\* REGION 25 \*  
THE STATE OF  
MONTANA**

Submitted: 15 JUN 92

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ORIGINAL FILE

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**William J. Jameson, Jr.**

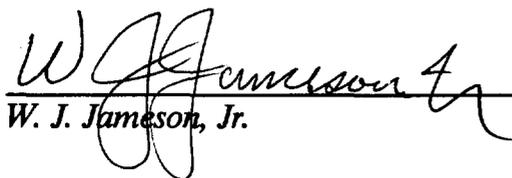
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JUN 18 1992  
MAIL BRANCH

**WILLIAM J. JAMESON, JR., WAS DULY ELECTED CHAIRMAN OF THE NATIONAL PUBLIC SAFETY PLAN REGION 25 PLANNING COMMITTEE ON 2 MAY 91 AT THE REGION 25 CONVENING MEETING.**

*I, William J. Jameson, Jr., Chairman of the Region 25 Planning Committee, submit this plan to the Federal Communications Commission on 15 JUN 92. This plan represents many hours of careful planning by public safety communications officials from across the Region and is recommended for your review and acceptance.*

  
W. J. Jameson, Jr.



# EXECUTIVE SUMMARY

In December of 1983, the United States Congress directed the Federal Communications Commission (FCC) to establish a plan to ensure that the communications needs of state and local public safety authorities would be met. By their regular means of initiation, the FCC began the process of developing such a plan. Through their efforts, and the efforts of the National Public Safety Planning Advisory Committee (NPSPAC), the plan was begun.

The National Public Safety Planning Advisory Committee provided an opportunity for the public safety community and other interested members of the public to participate in an overall spectrum management approach by recommending policy guidelines, technical standards, and procedures to satisfy public safety needs for the foreseeable future. After consideration of NPSPAC's Final Report and comments filed in Docket No. 87-112, the FCC released its Report and Order in December 1987. It established the framework of a national public safety plan and allocated 6 megahertz of spectrum in the 800 MHz band for its implementation.

The National Plan provides guidelines for development of forty-eight regional plans. The particulars of the National Plan are found in FCC 87-359, which contains the required developmental steps and contents of regional plans. We have based this plan for Region 25, the State of Montana, upon these guidelines and requirements.

Major elements of this plan include:

- How the Committee was convened, constituted, and operated (Sections 2.1, 2.2, and Appendix A);
- How the final plan was adopted (Section 2.2);
- How spectrum is put to best possible use by requiring minimum coverage areas (Section 3.4.2), providing for maximum frequency reuse (Section 3.5.1), encouraging consolidation of small systems (Section 3.3.3), establishing requirements for trunking (Section 4.2), and packing assignments through an efficient mechanism (Section 3.5.1);
- How interoperability is achieved through use of the International Common Channels and additional regional mutual aid channels (Section 4.1);
- How requirements of all eligibles were considered (Section 5.1) and spectrum allotted (Section 5.2)
- How this plan has been coordinated with adjacent regions (Section 3.5.9);
- How this plan will be carried out by a continuing Regional Review Committee (Section 2.2), an appeal process (Section 5.9), frequency give-backs (Section 3.4.6), and with slow growth provisions (Section 4.2.2); and
- Who the Committee members were (Section 6).



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## **1.0 SCOPE**

### **1.1 INTRODUCTION**

In December of 1983, the United States Congress directed the Federal Communications Commission (FCC) to establish a plan to ensure that the communications needs of state and local public safety authorities would be met. By their regular means of initiation, the FCC began the process of developing such a plan. Through their efforts, and the efforts of the National Public Safety Planning Advisory Committee (NPSPAC), the plan was begun.

The National Public Safety Planning Advisory Committee provided an opportunity for the public safety community and other interested members of the public to participate in an overall spectrum management approach by recommending policy guidelines, technical standards, and procedures to satisfy public safety needs for the foreseeable future. After consideration of NPSPAC's Final Report and comments filed in Docket No. 87-112, the FCC released its Report and Order in December 1987. It established the framework of a national public safety plan and allocated 6 megahertz of spectrum in the 800 MHz band for its implementation.

The National Plan provides guidelines for development of forty-eight regional plans. The particulars of the National Plan are found in FCC 87-359, which contains the required developmental steps and contents of regional plans. We have based this plan for Region 25, the State of Montana, upon these guidelines and requirements.

### **1.2 PURPOSE**

Public safety communications has, for many years, been inadequate throughout the United States. This is as true for Montana as for any other state. Many, if not all, public safety radio users have experienced outside interference, noise and crowded channels. It is with these problems in mind that this plan was developed.

This regional plan was developed with the objective of assuring that, for all levels of public safety/public service agencies, radio communications in the near and distant future will not suffer from the problems of the past. The allocation of frequencies was done as equitably as possible. The goal was to supply a pool of frequencies for each county, a pool for state agency use, adequate reserve allocations for future needs in all areas, and a method to appeal initial allocations based on need.

The National Plan, as developed by NPSPAC, was followed very closely in all considerations for frequency allocation, re-use, turn back, regional interoperability, spectrum requirements and adjacent region operations. This plan should provide the flexibility to accommodate the growth and changes which are certain to occur in public safety and public service communications operations long into the future.

## **2.0 AUTHORITY**

### **2.1 PLANNING COMMITTEE FORMATION**

The development of the Public-Safety Radio Communications Plan for Region 25 has followed the requirements of the FCC 87-359, the Report and Order on General Docket 87-112.

In accordance with that Report and Order, the Associated Public Safety Communications Officers Inc. (APCO) recommended to the Commission the appointment of a "Convenor" for Montana, Region 25. The Convenor acted as coordinator for assembly and formation of the planning committee. The Frequency Advisory Committee of the Montana APCO chapter served as a review body for convening plans.

The Planning Committee was formed through the following steps:

1. Primary notice of convening was made through direct mailings to Montana's 56 county Disaster & Emergency Services coordinators. Each DES coordinator was asked to identify all public safety radio using agencies and organizations within the county and notify them of the meeting and its potential impact.

Notice was published in the newsletters of the Montana Sheriffs & Peace Officers Association and the Montana Disaster & Emergency Services Division. All Montana APCO Chapter members were notified through mailings. Individual notices were sent to all State of Montana agencies who use public safety radio. Separate press releases were also sent to the Montana League of Cities & Towns, the Montana Association of Counties, and the Montana Fire Services Training School for dissemination through their news organs.

FCC Public Notice No. 12458 announcing the meeting was issued April 3, 1991.

Appendix A contains copies of notification materials.

2. The convening meeting was held May 2, 1991 in Helena, on the State Capital campus. There was unanimous agreement to form a planning committee.
3. A chairman was nominated and elected unanimously.
4. The assembled group chose to have all interested parties constitute the Committee-at-Large for advice and consent, while relying on a smaller working group to generate draft plans. Final plan approval was to be made by the Committee-at-Large, which is the regional planning committee.
5. Committee-at-Large membership was left open to any person or agency who may not have been notified or later decided to join the committee. The working group consisted of volunteers from the larger membership who were able to participate in plan development.
6. Vendors participation was encouraged, but vendors were not allowed a vote.

Participants in the formation of the Regional Planning Committee represented interested parties from both the Public Safety and Special Emergency Radio Services. A total of 30 individuals have participated in the development process.

### **2.2 REGIONAL PLANNING COMMITTEE**

Section 6 of this document contains the names, organizational affiliations, mailing addresses and phone numbers of all Regional Planning Committee participants. The Committee consists of all interested parties

in attendance at the convening meeting and those who asked to be involved, but were unable to attend.

Except for three commercial sector representatives, each committee member represented a single public safety agency or organization and was allowed one vote in all Committee matters. No more than one person represented any agency or organization. The majority of those present at a scheduled meeting constituted a majority for all business. Three working committee meetings were held.

Final approval of the plan prior to submission to the FCC was sought through a mail ballot sent to all those who had participated in the planning process. In this way, the finished plan was reviewed and accepted by the widest possible group of public safety/public service users.

### **2.3 NATIONAL INTERRELATIONSHIPS**

This Regional Plan conforms with the National Plan. If there is a conflict between the two plans, the National Plan will govern. It is expected that Regional Plans for other areas of the country may differ from this plan due to the broad differences in circumstance, geography, and population density. By officially sanctioning this plan, the Federal Communications Commission agrees to its conformity with the National Plan. Nothing in the Plan is to interfere with the proper functions and duties of the organizations appointed by the FCC for frequency coordination in the Private Land Mobile Radio Services, but rather it provides procedures that are the consensus of the Public Safety Radio Services and Special Emergency Radio Service user agencies in this Region. If there is a perceived conflict then the judgment of the FCC will prevail.

### **2.4 FEDERAL INTEROPERABILITY**

Interoperability among the Federal, State and Local Governments during both daily and disaster operations will take place primarily on the five common channels identified in the National Plan. Twenty more channels will be designated for large-scale operations which, in Region 25, involve hundreds of Federal radio users. Additionally, through the use of S-160 or equivalent agreements, a licensee may permit Federal use of a non-Federal communications system. Such use, on other than the five identified common channels, is to be in full compliance with FCC requirements for government use of non-government frequencies (Title 47 CFR, sec 2.103). It is permissible for a non-Federal government licensee to increase channel requirements to account for 2-10 percent increase in mobile units, dependent on the amount of Federal Government Agencies involvement in its area, provided that written documentation from Federal agencies supports at least that number of increased units.

### **2.5 REGIONAL REVIEW COMMITTEE**

Upon approval of this Plan by the Federal Communications Commission, a Region Review Committee will be established for the review of applications which do not fall within the stated guidelines provided for in this plan, or for the settlement of disputes concerning this plan and/or its application.

This Committee shall consist of the Local APCO Frequency Advisor for this region, a state agency representative, one representative from the Police, Fire and EMS services, and a minimum representation from other eligibles is also welcome. This Committee and its composition will be assured by the Montana APCO Chapter and other Public Safety organizations. Membership on this Committee will be solicited on an annual basis. Since this Committee will probably not have regular business, it will be the responsibility of the Local APCO Frequency Advisor to notify the Committee of problems, conflicts, or when it becomes apparent that spectrum demands will outpace available spectrum. Each member of the Committee shall be furnished a copy of this plan upon his/her appointment or election to the Committee.

Plan updates shall be accomplished by this Committee. All changes or updates to the plan shall be first agreed upon by this Committee and then submitted to the FCC for review and consideration. When approved, all changes shall be added to the plan with the appropriate documentation of approval.

This Committee shall meet at least once annually to review the implementation of the plan. This review shall consist of examination of any and all license activity. In addition, they shall review emerging standards related to 800 MHz and trunking and shall establish appropriate technical standards for plan implementation.

### **3.0 SPECTRUM UTILIZATION**

This portion of the Plan provides a basis for proper spectrum utilization. Its purpose is to guide the Local APCO Frequency Advisor and/or the Regional Review Committee in their task of evaluating the implementation of this plan within this Region.

#### **3.1 REGION DEFINED**

Region 25 is the State of Montana. This region was defined by the Federal Communications Commission as a result of recommendations made in the National Public Safety Planning Advisory Committee (NPSPAC) Final Report as submitted and approved and contained in Docket 87-112. For purposes of this plan the State of Montana shall be defined as all the lands and waters contained within the boundaries of the state.

#### **3.2 REGION PROFILE**

This section describes the general population and geography of Region 25. In comparison to other NPSPAC regions, Montana is characterized as geographically vast and demographically sparse.

##### **3.2.1 Montana Population And Expected Growth Percentage. (See Appendix B)**

The population of the state is 799,065 (1990 Census), with approximately 53% (420,000) living in urbanized centers and 47% (380,000) living in rural areas. Population density is approximately 5.5 persons per square mile. Total population grew 1.6% from 1980 to 1990. This slow growth rate is expected to continue.

##### **3.2.2 Geographical Description**

There are 56 counties in the state with a total land mass of 147,138 square miles. The largest county is Beaverhead, with a total of 5,551 square miles. The only water areas of significance in frequency planning are Flathead Lake in northwestern Montana with a surface area of approximately 200 square miles and Fort Peck Reservoir with a surface area of approximately 390 square miles and length of 134 miles. There are numerous significant mountain ranges in the State. These include the Cabinet, Purcell, Garnet, Mission, Bitterroot, Big and Little Belt, Crazy, Gallatin, Bridger, Tobacco Root, Madison, Absaroka, Beartooth, Pryor, Big and Little Snowy, Bull, Swan, Flathead, Salish, Sapphire, Pioneer, Tendoy, Ruby, Snowcrest, Gravelly and Whitefish mountain ranges.

The population of Montana is unevenly distributed across the great land area of the state. There are nine population centers of 10,000 or more persons and only two of 50,000 or more. This presents some problems in area coverage for radio systems in that the entire land area of any given jurisdiction must be covered. The population per square mile is somewhat sparse and the concentrations of radio users for public safety activities are somewhat dispersed. All of these items were taken under consideration in the allocation plan.

### **3.3 USAGE GUIDELINES**

Three levels of communications systems are distinguished here based on required coverage area: state, county/multiple municipality, and municipal.

#### **3.3.1 State Level Systems**

Public Safety communications at the state level, as it impacts Region 25, will be reviewed by the Regional Review Committee. Statewide public safety agencies will submit their communications plans for impact approval if they utilize 800 MHz communications systems within Region 25 and those portions of such systems must be compatible with the Regional Plan.

### **3.3.2 County/Multiple Municipality Systems**

Systems which are designed to provide countywide or communication coverage for multiple municipalities must demonstrate their need to require such wide area coverage. This would apply in a situation in which a city requests coverage of an entire county. Communication coverage significantly beyond jurisdictional boundaries will not be approved unless it is critical to the protection of life and property. If 800 MHz trunked radio technology is utilized, the system design must include as many county/multiple municipality government public safety and public service radio users as can be managed operationally.

County/multiple municipality systems, depending upon system loading and the need for multiple systems within an area, must provide intercommunications among area-wide systems. As a minimum this shall include use of the International Common Channels as specified here under Section 4. In a multi-agency environment, a lead agency shall be designated and shall be responsible for coordinating implementation of Common Channels in the 800 MHz band as mandated by the National Plan. Such implementation must be reviewed and approved by the Local APCO Frequency Advisor, and at his/her discretion, the Regional Review Committee.

### **3.3.3 Municipal Systems**

The term "municipal" is used to define the level below countywide. Municipal communications for public safety and public services purposes must provide only the communications needed within the municipal boundaries. However, if the total number of radios in service does not reach minimum loading criteria for a trunked system, that municipality must consider utilizing the next higher system level if 800 MHz trunked radio is available in the area. As countywide or regional systems reach capacity, the smaller communications system in public safety and public service should consider consolidating their communications systems.

Where smaller conventional 800 MHz systems are requested, those frequencies to be utilized must not interfere with nearby trunked systems. Any co-channel interference within an authorized area of coverage will be resolved on a case by case basis by the Regional Review Committee.

## **3.4 TECHNICAL DESIGN REQUIREMENTS FOR LICENSING**

Specific technical design requirements affecting spectrum utilization are discussed here. General system requirements are covered under Section 4.2 below.

### **3.4.1 Definition of Effective Coverage Area**

The effective coverage of a radio transmitter or combination of transmitters in a system under this plan shall be defined as that area in which the received signal strength is equal to or greater than 40 dB $\mu$ .

### **3.4.2 System Coverage Limitations**

Effective system coverage shall be limited to the jurisdictional area of the applicant plus no more than five (5) additional miles in all directions extending from the boundaries of definition. This limitation shall assure maximum frequency reuse. In the case of regional or area-wide, multi-jurisdictional systems, the coverage area shall be the combined area of all jurisdictions participating in the combined system. The only exception to this rule shall be those applicants wishing to offer service or system use to areas outside of their jurisdictional boundaries. In these situations the applicant shall provide a proposal of such service to the Local APCO Frequency Advisor, who may request Regional Review Committee review, for consideration.

Systems not located within the geographical center of the jurisdiction(s) which they cover shall utilize either directional antennas or antenna/tower configurations to achieve the coverage required by this plan.

### 3.4.3 Estimation Of Coverage

The Modified Egli Method<sup>1</sup> shall be used to estimate the area of coverage. This method allows calculations based on system parameters and corresponds closely to other methods of estimating the 40 dBμ signal level contours, including the Okamura/Hata method used for Region 25 frequency assignments. An irregular terrain correction factor has been added to the Egli Method to accommodate the terrain irregularities of Region 25.

The formula for estimating range in miles<sup>2</sup> is:

$$R = R_{SE} e^{-0.07\sqrt{\Delta h/h_e}}$$

where  $R_{SE}$  is the smooth earth estimate,

$$R_{SE} = 10^x$$

and

$$x = 1/40(P_T + G_T + G_R - L_{TT} - L_{RT} - L_P - L_N - 117 - S + 20 \log H_T H_R - 20 \log f)$$

$P_T$	= Power of base transmitter, dBW
$G_T$	= Gain of base transmitter antenna, dB
$G_R$	= Gain of mobile transmitter antenna, dB
$L_{TT}$	= Loss of base transmission line, duplexer, etc., dB
$L_{RT}$	= Loss of mobile system, dB
$L_P$	= Reliability degradation loss <sup>3</sup> , dB
$L_N$	= Noise degradation, dB (assumed 0 dB at 850 MHz for Region 25)
$S$	= Sensitivity of mobile receiver, EIA SINAD, dBW
$H_T$	= Base station antenna height above average terrain, ft
$H_R$	= Mobile antenna height, ft
$f$	= Base station transmit frequency, MHz
$\Delta h$	= Terrain irregularity, ft
$h_e$	= Effective antenna height, ft (assume $H_T$ )

Alternately, estimated coverage may be shown by recognized terrain-based propagation models, plotted on the maps. The Regional Review Committee may require additional showing of the validity of any coverage estimation.

---

<sup>1</sup> Singer, E. "Land Mobile Radio Systems", 1989.

<sup>2</sup> To determine  $\Delta h$  one uses the procedure described in NTIA Report 82-100, "A Guide to the Use of the ITS Irregular Terrain Model in the Area Prediction Mode", p. 21, calculating the median elevation variation for a set of regular or random paths from the transmitter.

<sup>3</sup> For a 90% probability of communication, a reliability degradation loss of 19 dB may be used. If  $\Delta h$  and  $h_e$  are unknown, add 6 dB to  $L_P$  and use the smooth earth estimate.

#### **3.4.4 Annexations And Other Expansions**

When an expansion of the corporate limits of any municipality currently using an 800 megahertz system occurs, the existing system may have to be expanded and its range increased. This shall be a permitted system modification.

The increased range of the system shall be determined at the time of modification to assure non-interference with other co-channel systems. Where interference is likely, the use of alternate methods of expansion, such as satellite receiver systems, may be necessary. Should the annexation or expansion of a city effectively take in all or most of a county, the allocation for that county may be given to the city if required by said city and not in use or planned to be used by the county. Where more spectrum is not available from the initial allocation, the rules for expansion of initial allocation, as contained in this plan, shall apply.

#### **3.4.5 Coverage Area Description**

Each applicant shall provide, with its application, a map showing the jurisdictional boundaries to be covered by the system, and the calculated system coverage. This map shall display the location of the system transmitter(s), including control stations. U.S. Geological Survey (USGS) topographical maps shall be used for this purpose, with 1:62,500 scale maps used for municipal systems, 1:250,000 scale for county, and 1:500,000 scale for statewide systems. Regardless of the type map used, the name of the applicant and the scale of the map shall be displayed on the map.

An estimated coverage area of each fixed transmitter shall be shown on the maps. The estimated range shall be calculated according to Section 3.4.3 above.

#### **3.4.6 Reassignment Of Frequencies**

All agencies participating in the use of the new 800 megahertz spectrum shall prepare and submit a plan for the abandonment of their currently licensed frequencies in the lower bands. These released frequencies shall be available for reassignment to those agencies not migrating to 800 MHz at this time.

A released frequency shall be returned to the radio service from which it was assigned. These frequencies shall then be available for reassignment via the assignment/coordination criteria in effect for that particular service by the FCC authorized coordinator for that service. Relinquished frequencies shall not be handed down automatically to another agency within the respective jurisdiction. The Regional Review Committee may make reassignment recommendations on released frequencies.

It is recommended that any jurisdiction wishing to "hand down" frequencies to another agency submit the proper coordination and application forms with the document of release. This will put the applicant in a better posture for reassignment of the frequency in question. It should be noted that even though this procedure is followed, there is no guarantee that a particular frequency will be assigned to the returning jurisdiction.

The time frame allowed for phasing into 800 MHz and out of the lower currently licensed bands will be considered on a case by case basis by the Review Committee. Generally one year will be considered acceptable in most cases, with two years as a maximum. Any agency requiring more than two years shall provide documents stating the reasons for the delay, and give the estimated time of completion.

### **3.5 INITIAL SPECTRUM ALLOCATION**

#### **3.5.1 Frequency Sorting Methodology**

The initial spectrum allocation for Region 25 was determined by a computerized frequency sorting process performed by C.E.T., Inc. of Edgewater, Florida. The purpose of the computer program, which assigns

frequencies to specific eligibles and to pools for future assignments, is two-fold:

- A) The assignments must be made in a manner which results in high spectrum utilization, and
- B) The assignments must be made in manner which results in a low probability of co-channel and adjacent channel interference.

Since the desired output is a geographic sorting of frequencies, a method of defining geography must be part of the input. A list of the number of channels to be assigned in each geographic area is also required, along with the name of the eligible or pool.

Acceptable interference probabilities are determined for Region 25. Frequency assignments are then made using a computer program which satisfies the goals of spectrum efficiency and interference protection. The following narrative describes the factors and process used by the computer program.

### **3.5.2 Geographic Area**

For the purpose of this frequency sort, a geographic area is defined as a set of circles of equal radius. To the degree practical, the set of circles should include the entire area of the eligible's geopolitical boundary, but not exceed the boundary by more than three (3) miles. Thus the procedure is to gather maps of sufficient detail, outline the areas to be defined, determine the coordinates and radii of the circles which define each area, and tabulate the data.

### **3.5.3 Environment Definition**

The environment of each system is defined according to the Okumura/Hata method classifications. For purposes of frequency allocation, all of Region 25 has been considered open terrain. Very little signal attenuation due to man-made structures can be planned for in assigning Region 25 channels.

### **3.5.4 Blocked Channels**

Forty-seven (47) channels shall be blocked for statewide allocation. This includes the five International Common Channels, twenty Interagency Incident Management channels, sixteen State of Montana channels, and six wide-area channels for statewide administrative use. Since the International Common Channels are spaced at 0.5 MHz intervals and have built-in adjacent channel protection, the remaining blocked channels shall be grouped along these intervals to minimize impact on smaller system allocations.

### **3.5.5 Transmitter Combining**

The computer program is designed to provide a minimum frequency separation between any two channels assigned to the same eligible at the same site. This separation is provided in order to enable more efficient combining of multiple transmitters feeding a single antenna. These separated blocks of frequencies also have a maximum size. That is, if the eligible has more frequencies than the maximum size of the combining block, then a second compatible block shall be created, and so on. Each of these parameters is adjustable in the program on a global basis. The default parameters chosen are 0.25MHz minimum spacing and blocks of five channels.

### **3.5.6 Special Considerations**

There are licensees in the 806-821/852-866 Mhz spectrum who plan to expand existing systems into the 821-824/866-869 MHz bands. Existing radio units are unable to operate on 12.5 KHz separated carrier frequencies. The result is that these radios can only operate on "even" FCC numbered channels in the 821-824/866-869 MHz band. The computer program is able to take this into account when making assignments.

### **3.5.7 Protection Ratios**

There are two interference protection ratios built into the computer program. One is for the co-channel case, the other is for the adjacent channel case. The ratios provide 35 dB Desired/Undesired signal ratio for co-channel assignments, and 15 dB Desired/Undesired ratio for the adjacent channel case. These ratios provide an acceptable probability of interference for Public Safety Services.

### **3.5.8 Unused Spectrum**

Due to the fact that all of the frequency spectrum is not needed at this time, the excess channel pairs will be returned to a reserve pool. Frequencies in this pool will be used for resolving allocation conflicts and unanticipated needs. This does not imply that these frequencies are unavailable, only that before they can be utilized they must be coordinated via the regular APCO coordination process and within the guidelines set forth in this plan. Whenever possible, the channels designated for a jurisdiction in this plan shall be used.

### **3.5.9 Adjacent Region Coordination**

This plan has been coordinated with all adjacent regions. Those adjacent regions are: Idaho (Region 12), Wyoming (Region 46), Washington (Region 43), South Dakota (Region 38), North Dakota (Region 32), and Canada. Specific channel allocations have been coordinated with Regions 43 and 46, which are the only two to have completed plans. The coordination was conducted automatically through each Region's reliance on the C.E.T packing program. Allocations affected by proximity to Canada were coordinated automatically by the program, as well.

Coordination with adjacent Regions shall be an on-going process until all regional plans have been finalized. At present, all adjacent regions have been coordinated with and no conflicts have been identified.

(SEE ATTACHED LETTERS APPENDIX C)

Use of the five International Common Channels has not been coordinated with adjacent regions.

## **4.0 COMMUNICATIONS REQUIREMENTS**

### **4.1 MUTUAL AID AND COMMON CHANNELS**

Region 25 has a great need for communications interoperability due to its large geographic area, sparse population, and numerous public safety entities. Interagency response to emergencies and disasters is common. Consequently, a sizeable block of frequencies is designated for mutual aid and common communications.

The five International Common Channels shall be used as originally recommended by NPSPAC and ordered by the FCC under General Docket 87-112. They shall be used as the primary interoperability channels for small and large incidents.

An additional twenty channels shall be assigned statewide as the Region 25 Interagency Incident Management (IIM) Channels. Recent experience during large-scale emergencies and natural disasters has shown that five common channels alone are inadequate. The forest fires of 1988 and a Helena train derailment in 1989 brought hundreds and, in some cases, thousands of emergency responders together. Growing use of the National Interagency Incident Management System (NIIMS) Incident Command System (ICS) to manage such large groups has led the Region 25 Planning Committee to allocate enough channels for complex incidents.

Six more channels shall be allocated statewide for wide-area administrative use by state, county, and municipal entities. Approved uses will include paging and other routine communications not allowed on the International Common Channels.

#### **4.1.1 Implementation**

Implementation of the International Common Channels shall follow the guidelines set forth by the Federal Communications Commission by its approval of the National Plan. The International Common Channels are accessible by all levels of government and shall be used only in accordance with the National Plan.

Implementation of the Region 25 Interagency Incident Management and the Wide-Area Administrative Channels shall follow the guidelines set forth in this Plan and as modified in the future by the Regional Review Committee. The State of Montana may adopt future operational plans for use of these channels under its statutory authority and submit them to the Regional Review Committee for formal inclusion in this Plan.

All mobile and portable units shall be equipped to operate in a "talk-around" (simplex) mode when required on all common and mutual aid channels.

##### **4.1.1.1 International Calling Channel**

The International Calling Channel (821/866.0125 MHz) shall be implemented as a full mobile relay. Wide area coverage transmitters will be installed where applicable within a system. Large system users (5 channels or more) of 800 MHz NPSPAC frequencies shall be required to monitor this channel at all times. The area of coverage for this channel shall be equal to the area covered by the licensed system. This may or may not require the use of satellite receivers within the system.

##### **4.1.1.2 International Tactical Channels**

The four International Tactical Channels will be available statewide for use by all eligible public safety licensees and others as assigned under specific incident communications plans. Any local, state, or Federal public-safety entity may operate mobile or portable radios on these channels in Region 25 without license. Other disaster relief and emergency management services may make similar use as provided for in the

National Plan only under specific incident communication plans. ICS 205 "Incident Radio Communications Plan" and its derivatives, completed at the time of the incident, are considered adequate communications plans as required here.

All permanent base and control transmitters on these channels shall be licensed with the FCC. Temporary base and control stations designated under specific incident communications plans shall be allowed without license, subject to the provisions of FCC Rules & Regulations, §90.137(b).

#### **4.1.1.3 Interagency Incident Management Channels**

The twenty Interagency Incident Management Channels shall be implemented as are the International Tactical Channels, except that all use must be covered by specific incident communications plans, completed at the time of the incident. No permanent base or control stations shall be licensed on these channels.

#### **4.1.1.4 Wide-Area Administrative Channels**

Any of the six Wide-Area Administrative Channels may be implemented, upon designation by the Regional Review Committee, in a specific service or function (police, fire, public works, etc.), as appropriate and necessary after public notice and a 60 day comment period. However, at least two of the six shall be retained for general administrative use and paging.

In the event of a major incident, two of these channels shall be made available for incident command and management. Channel 730 (822/867.7125 MHz) shall be used for a dedicated channel between the incident commander and the emergency operations center (EOC) which directly supports the incident. Channel 732 (822/867.7375 MHz) shall be available as a communications channel between and among the EOC and public agency managers who have responsibilities in support of the incident command. Public safety entities which maintain emergency operations centers shall be permitted to license these channels for these purposes only.

### **4.1.2 Operations**

The International Common Channels and Region 25 Interagency Incident Management Channels shall be available for use throughout Region 25. No specific assignments are deemed necessary. They shall be used only for activities requiring communications among agencies not sharing any other compatible communications system. They shall not be used by any agency for routine, daily operations or for interagency communications not requiring interoperability.

Police, fire, and providers of basic and advanced life support services will be the primary using agencies. If radio channels are available, other entities provided for in the Public Safety Radio and Special Emergency Radio Services may also participate to the extent required to insure the safety of the public. These agencies include the Montana Departments of Transportation and Institutions, local public works departments, and other public service agencies not normally involved in day to day public safety operations.

Private disaster relief and emergency management services, including licensed amateur radio operators, may be authorized under specific incident communication plans.

These channels shall be operated with CTCSS using the Common Channel tone frequency of 156.7 Hz. Individual agencies, however, may operate in a mobile-to-mobile, talk-around (simplex) mode without CTCSS (See Sections 4.1.4 and 4.7).

#### **4.1.2.1 General Procedures**

Plain English will be used at all times on mutual aid and common channels. The use of unfamiliar terms, phrases, 10-signals or codes will not be allowed.

The ICS 205 "Incident Radio Communications Plan" and its derivatives, completed at the time of the incident, are considered adequate communications plans as discussed under this part. Incident commanders and others responsible for assigning radio frequencies during multi-agency incidents must understand the rules, regulations, and binding procedures that affect those frequencies.

All use of the Region 25 Interagency Incident Management Channels and all non-public safety use of the International Common Channels must be covered by a specific, written communications plan.

#### **4.1.2.2 International Calling Channel (ICALL):**

The International Calling Channel shall be used to establish contact with other users in Region 25 who can render assistance at an incident. This channel shall not be utilized as a working channel. Once contact has been established between agencies, an agreed upon tactical or mutual aid channel shall be used for continued communications.

ICALL shall be monitored by any activated Emergency Operations Center (EOC) capable of 800 MHz operations and by designated Incident Communications Centers, as defined under the Incident Command System "Operational System Description", ICS-120.

#### **4.1.2.3 International Tactical Channels (ITAC 1 - ITAC 4):**

These frequencies are reserved for use by agencies involved in interagency communications. Incidents requiring multi-agency participation shall utilize these frequencies as directed by the control agency assuming responsibility for an incident or area of concern. In major emergencies, one or more tactical channels may be assigned by the incident commander or unified incident command as defined under ICS-120.

These frequencies may be subdivided according to function in an incident or by geographical location in response to an incident. It is recommended that the following assignments for ITAC-1 through ITAC-4 be used when possible.

ITAC-1 Highest level of operational command;

ITAC-2 Highest level of law enforcement command;

ITAC-3 Highest level of fire command;

ITAC-4 Highest level of EMS command;

#### **4.1.2.4 Interagency Incident Management Channels**

These frequencies are reserved for multi-agency incidents where interoperable communications needs are not satisfied by the ITAC channels alone. Operations on these channels shall be conducted only under a specific incident communications plan. One or more channels may be assigned by the incident commander or unified incident command as with the ITAC channels and only after the ITAC assignments have been made.

The Interagency Incident Management Channels may be used during incidents for cross-banding or bridging to other public safety systems or wide-area communications facilities.

#### **4.1.3 Tone Coded Squelch**

All equipment capable of operating on mutual aid and common channels shall be equipped to operate with the National Common Squelch Tone of 156.7 Hz. Mobile relay control stations on these channels, if authorized, may use additional tones or digital squelch codes for the purpose of selecting individual mobile relay stations, provided the National Common Squelch Tone is used on the output. If such an arrangement is used, provision must be made for their activation by the 156.7 Hz tone to ensure access by transient units.

#### 4.1.4 Cross-Band Operation

Any jurisdiction operating base stations on the International Common Channels (ICALL and ITAC) is encouraged to enable cross-band operation to allow users of VHF High Band mutual aid channels (e.g. 155.475, 153.905, 154.280 MHz, etc.) to communicate with Common Channel users in inter-agency operations.

#### 4.1.5 Network Operations

Communications systems on ITAC 1 through ITAC 4 will be implemented on a voluntary basis by 800 MHz system users distributed throughout Region 25. The assignment of these ITAC systems shall be coordinated by the Local APCO Frequency Coordinator. Every primary geographic area of Region 25 is intended to be covered by at least one ITAC channel. In many areas the International Common Channels will be utilized on a mobile-to-mobile talk-around basis. Mobile relays on ITAC 1 through ITAC 4 will be of a limited coverage design to permit reuse of the channel several times within Region 25 and in adjacent regions. Since Region 25 will probably not have a large number of stationary ITAC stations, the implementation of mobile relay or repeaters is desired. This will fill an "on scene" requirement for most multi-agency response situations. Adjacent Region coordination will be via existing mutual aid coordination procedures with the requesting Region establishing the tactical frequency assignment.

### 4.2 GENERAL SYSTEM REQUIREMENTS

All systems operating in Region 25 which have five or more channels shall be trunked. Those systems having four or less channels may be conventional or trunked. It is strongly suggested that any entity licensing three or more repeaters use trunking. The FCC in its Report and Order states: "Exceptions will be permitted only when a substantial showing is made that alternative technology would be at least as efficient as trunking or that trunking would not meet operational requirements. Exceptions will not be granted routinely. Strong showings as to why trunking is unacceptable must be presented in support of any request for exception."

Systems which do not meet FCC loading standards may be required to share frequencies on a non-exclusive basis. Those agencies requesting data-only channels can be required to share channels with adjacent agencies wherever feasible or limit coverage to their geographic area. Exceptions will be considered on a case-by-case basis by the Review Committee.

A single municipality or agency must restrict design and implementation of its system(s) to provide only the communications needed within its geopolitical boundaries. The use of trunked systems is encouraged. However, if the total number of radios in service does not reach the minimum criteria for a trunked system, the user must consider participating in the next higher system level if 800 MHz trunked radio is available in the area. As systems reach capacity, smaller system users must consider consolidating their communications systems to formulate a single trunked system.

A requesting applicant for radio communications in the 800 MHz public safety services in Region 25 will be required to conform to the FCC loading criteria for its proposed system. The provisions of this regional plan must be used as a guide for establishing any new systems. Strict adherence for limiting the area of coverage to the geographical area (Section 3.5.2) of the applicant agency's jurisdiction must be observed. Overlap or extended coverage must be minimized even where systems utilizing 800 MHz trunked radio systems are proposing to intermix systems for cooperative and/or mutual aid purposes.

Antenna heights are to be limited to provide only the necessary coverage for a system. When antenna locations are restricted to only the "high-ground", transmitter outputs and special antenna patterns must be employed to produce only the necessary coverage with the proper amount of ERP. All necessary precautions shall be taken to gain maximum reuse of the limited 800 MHz spectrum.

#### 4.2.1 Channel Loading Requirements

An agency/jurisdiction requesting a single frequency to replace a frequency currently in use that will be turned back for reassignment will not be required to meet loading requirements in order to obtain the new frequency. However, if the single frequency is not loaded to more than 50 units within three years after the license is granted, the frequency will be available for assignment to other agencies on a shared basis in the event that other frequencies meeting the criteria for assignment are exhausted. Shared use of a frequency is not interference free. Users of single frequency systems may be required to provide the Regional Review Committee "confirmation of loading" for mobiles and portables as a method of validating system loading. This exception shall apply to agencies having only one system and a single frequency. Agencies/jurisdictions requesting multiple frequencies or employing trunking technology shall comply with the loading standards as outlined below or provide a "Traffic Loading Analysis" that meets the criteria as outlined below.

##### 4.2.1.1 Loading Tables

<u>EMERGENCY</u>				<u>NON-EMERGENCY</u>			
# CHANNELS		UNITS/CHANNEL		# CHANNELS		UNITS/CHANNEL	
1	-	5	70	1	-	5	80
6	-	10	75	6	-	10	90
11	-	15	80	11	-	15	105
16	-	20	85	16	-	20	120

Agencies which request additional frequencies must demonstrate that they meet or exceed the required number of units per channel (from the above table) necessary to justify an additional channel(s). Should a demand for frequencies exist after assignable frequencies become exhausted, any system which has frequencies assigned under this plan four or more years previously and not loaded to at least 70 percent of the tabular unit loading requirements will lose operating authority on a sufficient number of frequencies to bring the system into compliance with the 70 percent loading standard. Frequencies lost in this manner will be reallocated to other agencies to help satisfy the demand for additional frequencies.

##### 4.2.1.2 Traffic Loading Analysis

In lieu of using the loading tables in 4.2.1.1, a jurisdiction (countywide or municipal) may provide a traffic analysis which has determined the Grade of Service (GOS) of its present radio system (see Glossary in Appendix D for all terms used in this section). An additional frequency(ies) may be allowed:

1. If the GOS is less than 0.85 at peak busy hour (PBH)
2. If the GOS is less than 0.92 at the bouncing busy hour (BBH).
3. If the GOS is less than 0.95 at the time consistent busy hour (TCBH).

The determination of these grades of service may be made:

1. Manually by recording, by means of a stop watch, the number and length of all transmitted and received radio messages for a period of:
  - a. Sixty (60) days if PBH data is used to justify additional channel(s).
  - b. Thirty (30) days if BBH or TCBH is used to justify additional channel(s).

2. Automatically, by means of a suitable traffic recording device, the number and length of all transmitted and received radio messages for a period of:
  - a. Ninety (90) days if PBH data is used to justify additional channel(s).
  - b. Thirty (30) days if BBH or TCBH is used to justify additional channel(s).

If a traffic analysis is performed, separate counts shall be made for each channel unless the system is trunked. Moreover, raw traffic data must be maintained and made available to the Local APCO Frequency Coordinator upon request.

Data justifying the requirement shall be submitted in the format of Appendix E.

The Local APCO Frequency Coordinator will use the Erlang C method to compute the GOS for each application for additional channels.

#### **4.2.2 Slow Growth**

All systems in the 821-824/866-869 MHz bands under this Plan will be 'slow growth' in accordance with Section 90.269 of the FCC Rules and Regulations.

#### **4.2.3 Use of Long Range Communications**

During incidents of major proportions, where Public Safety requirements might include the need for long-range communications in and out of a disaster area, alternate radio communications plans are to be addressed by Primary Public Safety agencies within this sub-region. These agencies should integrate the appropriate interface to the long distance communications providers. Such long distance radio communications might be amateur radio operations, satellite communications and/or long range emergency preparedness communications systems, any or all of which should be incorporated as part of the communications plans of those lead agencies. This procedure would provide system users with the means to communicate outside the area for themselves and the smaller agencies who might need assistance. Instances as addressed in the National Public Safety Planning Advisory Committee's Plan, such as earthquakes, hurricanes, floods, widespread forest fires, or nuclear reactor problems could be a cause for such long-range communications needs.

#### **4.2.4 Expansion of Existing Systems**

Existing systems which are to be expanded to include the frequency bands of 821-824/866-869 MHz will have the mobile radios "grandfathered", provided that they are modified in conformance with the Memorandum Opinion and Order, FCC Docket 87-112. Primarily this involves reducing the modulation to +/- 4 KHz. Existing base stations in the frequency bands 806-821/851-866 MHz may not be used in the frequency bands 821-824/866-869 MHz.

#### **4.2.5 Tone Squelch**

All systems implemented under this plan shall operate with a continuous tone coded squelch system (CTCSS) according to the tone plan included in the frequency plan in Appendix F. Any municipal, county-wide or regional jurisdiction may authorize mobile-mobile talk-around (simplex) traffic without CTCSS for tactical operations within the jurisdiction.