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ANALYSIS OF RADIO COMMUNICATION SYSTEM
FOR
NEW HANOVER COUNTY SHERIFF'S DEPARTMENT
WILMINGTON, NORTH CAROLINA

U.S. Department of Justice
National Institute of Justice

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Task #7901301

This report is based upon a study of the communications facility of the New Hanover County Sheriff's Department conducted on March 9-11, 1979. The findings of this report reflect the technical opinions of the advisor and not necessarily of APCO, Inc. or the LEAA which funded this project.

Norman R. Coltri
Norman R. Coltri, Advisor
March 22, 1979

INTRODUCTION

The New Hanover County Sheriff's Department provides basic law enforcement service for the major geographic portion of the County. The City of Wilmington provides for its own police protection as do several smaller areas such as Carolina Beach. The Sheriff's Department provides backup to all of these agencies during emergency situations. The County is small in comparison with most in North Carolina, being only 90+ square miles. The attractions of the beach area however, provides for a seasonal population swell to approximately 150,000 persons. This seasonal activity provides for a much increased work load for the law enforcement agencies.

Currently the Sheriff's Department has one dispatcher on duty at all times. It is the responsibility of this dispatcher to answer both the administrative and emergency telephone numbers. During a normal shift ten to fifteen cars will be on the road. The dispatcher will control these cars and provide interface to the statewide computer information network (PIN System).

The radio hardware of the Department consists of a one position console which permits operation on the normal agency communications system. Also included in the console are an area wide mobile mutual aid system and a dispatcher interconnect intercity system. All base station radio equipment is located remote from the dispatch office. Telephone lines are utilized to connect the console to radio facilities, approximately two and one half (2½) miles away. The Department maintains a radio tower and outbuilding within an

area owned by the City of Wilmington. This facility housed the radio equipment for the normal agency communication system and the equipment for the area wide mobile mutual aid system. A natural gas powered emergency generator is provided for power backup. The intercity dispatcher interconnect system is operated through remote control of a base station located at the City of Wilmington Police Department. The City is the apparent owner of this equipment with the Sheriff's Department being permitted to share the operation of the station.

The mobile equipment of the Department consists of 25 mobile radios and 22 portable units. The mobile radios and portable units are four channel and operate in the following manner: Channel one is the normal agency communication system. Channel two provides a "talk around" to the normal operating channel mobile relay station. Channel three provides for an in-car repeater to allow portables to be retransmitted by the mobile radio which would extend their range on the normal operational channel of the Department. Channel four is the area wide mutual aid system which is shared by all agencies in the County as well as Pender and Brunswick Counties which surround New Hanover County.

All of the present radio equipment owned by the Sheriff's Department is of late vintage. The equipment seems well maintained and should continue to provide satisfactory service for the foreseeable future.

A multi-channel logging tape recorder was noted in the dispatch office, however, this recorder was not operational. Currently the Department is in the process of having this recorder repaired.

The Department plans in the near future to assume reporting and dispatch functions for a significant proportion of the volunteer fire and ambulance associations with the County. This added workload will take place after the Department moves into a new County building currently under construction.

The Department presently maintains separate emergency and administrative seven digit telephone numbers. Plans are being formulated for a countywide 911 system. The answering point for this system has not been determined at this point of the 911 study. The Sheriff's Department, as dispatch for many fire and ambulance units may be considered for this additional responsibility.

PROBLEMS

In discussion with Sheriff Radewicz, Capt. Hayes - Patrol Commander, Sgt. Dawson - Records and Communications and Col. Mamott, - Investigating Officer, several problem areas were outlined. The areas in order of their perceived importance are:

1. Radio System Congestion
2. Overworking of one dispatcher
3. Radio coverage "dead spots"
4. Communications backup

ANALYSIS

Radio System congestion was the basis for the technical assistance request to APCO. Thus this problem was indicated to be the prime difficulty with the radio system. Correspondence indicated that the current system consisted of four channels. While the mobile and portable equipment has four channel capability, the normal communication system is operated on one radio frequency pair. Channels one, two, and three of the mobile and portable radios consist of the same 453.500/458.500 MHz mobile relay pair in different configurations. Channel one is normal mobile relay operation. Channel two provides talk around on 453.500 MHz. Channel three engages on in-car repeater system, where portables transmitting on 453.500 MHz are repeated on to the normal operational channel (458.500 MHz) similar to a mobile operating on channel one. All radios when operating on channel one, two or three receive 453.500 MHz. Thus it is not possible to isolate any activity occurring on these three channel positions from one another.

A fourth channel position is operable on 453.700/458.700 MHz. This mobile relay pair is utilized as an area wide mutual aid channel by all the departments in New Hanover County and the surrounding counties of Pender and Brunswick. Since it is necessary for all mobiles in the three county area to have continuous radio coverage, several mobile relays are installed throughout the three county area without continuous tone coded squelch. It is not uncommon for a New Hanover car to activate several mobile relays simultaneously. As a result any one conversation on this channel

has the potential of being rebroadcast throughout several counties. This channel cannot be used as a secondary dispatch channel during peak load.

The Sheriff's Department has 25 mobiles and 22 portables used for law enforcement activities as well as three vehicles used in the civil section for court activities. During peak periods and emergency situations, there is no ability to separate radio traffic. The mutual aid channel is now being used to provide a degree of relief within the department. This practice is not the proper use of the mutual aid system since it involves only one agency.

A second problem area is the overworking of the communications dispatcher. The current radio system provides a one position control console. It is usual for one dispatcher to operate all communications facilities. Sitting with the dispatcher on a Friday evening showed that the workload is extremely high. The responsibility of the dispatcher ranges from the telephone to radio and computer terminal. A department study indicated that peak time telephone calls average two to three calls per minute. Peak radio units are approximately fifteen per shift. Computer information is a variable which is sometimes curtailed due to workload. During a change of shift it was noted that the off-duty dispatcher leaned over the back of the console to answer vehicles and dispatch calls in an attempt to assist the on-duty dispatcher become acclimated to the high workload. The planned addition of fire and ambulance dispatching will further increase

the workload of the dispatcher.

The third area of concern is caused by numerous radio "dead spots" throughout the County. Although the County is small in area, the layout is elongated such that communications is required fifteen miles from the transmitter. A field survey conducted showed that problems of talk-back to the mobile relay were present in the southern end and the northeast portion of the County. The mobile relay station is presently located in the approximate geographic north-south center of the County. There seems to be no problem encountered in the talk-out (base to mobile) portion of the system.

The final problem discussed was the lack of backup radio facilities. The Department has experienced normal radio failures which have resulted in the loss of communication. The single console connected by telephone line to a single base station presents a high potential for failure.

FINDINGS

As a result of consultations with members of the Sheriff's Department, and field surveys, the problems with the communication system were defined and analysed. While the listed problems do exist, the priority for solving these problems should be revised.

The most significant problem noted was that of communications backup. This redundancy of system applies to telephone as well as radio. The main radio transmitter is located in an outbuilding about two and one half miles from the dispatcher. A serious problem was noted with access to this site. This transmitter is located on property under control of the City of Wilmington. The Sheriff's Department does not have access through the gate to the property after normal hours. A communication failure requires that a city employee respond to open the gate for the radio repair service. The Sheriff should have unrestricted access to the radio equipment. This building is provided with a natural gas powered generator for backup power. This gas powered generator is not provided with on site reserve fuel. In a disaster situation, both commercial electrical power and gas mains may be disrupted. Normal electrical failure of the transmitter must be expected from time to time as well as the disruption of the connecting telephone line due to storm or man made causes. For this eventuality, a standby transmitter should be purchased and placed at the dispatch center. An ideal location for this standby transmitter would be atop the new County building housing the Sheriff's Department. In-house cable could

connect this transmitter to the communications console.

Backup telephone facilities are also nonexistent. This applies to the message as well as the station equipment. The existing multi-channel tape recorder should be placed in service as soon as possible. In addition, consideration should be given to the addition of an instant call playback unit. This unit would repeat the last few telephone messages which would provide the dispatcher with message backup. The actual telephone lines should be provided to a second dispatch center removed from the present location. This would provide redundant operation should a cable failure place the dispatch center out of operation.

The second most serious problem is that certain areas of the County exhibit poor talkback to the mobile relay. These "dead spots" are located in the southern and northeastern area of the County. The main mobile relay station operates as a self contained unit. Cars and portable units received at this main location are retransmitted to other field units and to the dispatcher via telephone lines.

Some portable units utilize in-car repeaters to provide the necessary power to allow signals to reach to the main site. Some portables are utilized without these in-car repeaters resulting in very poor coverage. Some mobiles have even been located in areas where signals were very weak or non-existent back to the mobile relay.

The proper method for solving this talk-in problem is the installation of a remote receiver system. This system known as a Satellite Receiver System allows more than one receiver to be connected to

the transmitter, thus providing for improved coverage.

It is suggested that a receiver comparator be located at the dispatch console. Each of the remote receivers would be connected to this voting selector. The voter output could then be routed to the main transmitter or to the standby transmitter in the dispatch building. This switching would be accomplished on the dispatch console. Status lights from the voter should be visible from the console position to show that all receivers are operating properly. The receiver at the main remote transmitter should be configured as a reverting receiver. This provides that any failure of the receiver system would revert the operation back to a single receiver.

Receivers connected to the voter should be located at:

1. The new County building which will provide central coverage.
2. The Carolina Beach area which will provide southern coverage.
A possible location would be the water tower in Carolina Beach.
3. The Castle Hayne or Ogden fire stations which would provide northern coverage.

The use of these additional receivers would allow for the removal of in-car repeaters from patrol vehicles. The in-car repeater radio channel 453.350 MHz, would be available for other uses as detailed further in this report.

A third problem noted with the communications system is that the dispatcher appears to be overworked during peak hours. The task of operating the terminal, controlling field units and answering all telephone calls seems to reach a peak during the late afternoon

and early evening hours. It is suggested that consideration be given to providing additional assistance during peak hours. It is anticipated that the dispatch center will soon be responsible for the alerting of a good number of fire and ambulance units. This additional workload further justifies the need for peak time assistance. This additional assistance would require a second dispatch console position. This second position need not be as elaborate as the existing console. Only the normal operational Sheriff, fire and ambulance channels need be duplicated. The console could be of the desk top type which would further reduce cost. A second telephone instrument would also be required, as well as common access to a status card bank. A status card system rather than a page line log, is almost a necessity when two or more dispatchers are operating on the same system.

Congestion of the normal radio channel is identified as the fourth problem with this system. This congestion occurs during peak hours and during times of special activities. There is only one radio channel available for use by the Sheriff's Department. The Mutual Aid channel has limited application to such times as inter-agency cooperation is necessary. The Department from time to time has used this channel for intra-agency communication. It is suggested that the Department pursue the assignment of additional radio channels. The use of a satellite receiver system removed the need for an in-car repeater. The channel 453.350 MHz which was used for the in-car repeater could be used as a CH 2 car to car frequency.

This would replace the current CH 2 talk around and provide an independent channel for coordination of vehicle activity. In the future, providing funds are available, a second mobile relay channel could be added to CH 3 of the existing radio units. This could result in two base mobile contacts and one car to car contact without mutual interference with communications. A contact with the APCO frequency coordinator for the area, Mr. W.B. Sloop, indicated that 453.875/458 or 453.900/458 MHz would be possible channels for CH 3. The cost for adding a separate CH 3 could be reduced by using the backup transmitter for the CH 3 system. This would mean that during a failure, the system would revert back to one channel. The frequency and duration of failures must be considered prior to utilizing this backup transmitter for CH 3 operation. A second satellite receiver system would be required for use on this additional channel.

RECOMMENDATIONS

1. Backup facilities be added to the existing transmitter and telephone system.
2. A satellite receiver system be added to eliminate dead spots.
3. A second dispatch position be added to allow for a part-time two dispatcher operation. This is especially important when fire and ambulance is added.
4. A four wire circuit be used to connect the console with the mobile relay. This allows the dispatcher to receive emergency calls from vehicles while transmitting lengthy messages.
5. Eliminate the use of in-car repeaters and utilize that frequency as a car to car channel, CH 2, independent of the main channel CH 1.
6. Investigate the possibility of adding a second mobile relay system on another radio channel, CH 3.
7. Attached is a recommended configuration layout for mobile and control console channel assignments.

Radio Configuration

Mobiles and Portables

- CH 1 - Existing Mobile Relay Assignment 453.500/458.500 MHz.
- CH 2 - Car to Car Channel. This would utilize the existing in-car repeater channel of 453.350 MHz without a mobile relay for local car to car operations.
- CH 3 - An additional mobile relay would be coordinated to provide relief for peak period and special activities.
- CH 4 - Existing Mobile Relay Channel used for mutual aid.

Main Console

CH1 453.500/ 458.500 MHz Operational Channel	CH 3 453.xxx 458.xxx MHz Special Operations Channel	CH 4 453.700 / 458.700 MHz Mutual Aid	CH5 155.190 MHz Inter-city Dial up System	CH 6 Fire Dispatch
CH 7 Fireground Operations	CH 8 Ambulance Dispatch			

Secondary Console

CH 3* 453.xxx 458.xxx MHz Special Operations Channel	CH 6 Fire Dispatch	CH 7 Fireground Operations	CH 8 Ambulance Dispatch	
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* Until CH 3 is in operation CH 1 could be duplicated in this position.

APPENDIX

It is anticipated that a 911 system will be implemented in the County within two years. The Sheriff's Office, as dispatch for primary law enforcement service in the most significant geographic area of the County and for many fire and ambulance associations, may be the 911 answering point. This would require a major revamping of communications operations. The Department has the necessary inpedance for this operation. The Sheriff should be involved in any 911 study in the County. The Sheriff's Department should investigate the potential of an expanded 911 system (E911). This new type of 911 system would allow all 911 calls to be automatically directed to the appropriate emergency answering point and would eliminate the need for having all 911 calls directed to only one agency in the County.

As the addition of fire and ambulance is imminent, attached is a copy of Guidelines for Fire and Ambulance Dispatch.

The APCO Frequency Coordinator for North Carolina is:

Mr. W.B. Sloop
1204 Glen Eden Drive
Raleigh, N.C. 27612
919-787-4737

GUIDELINES

EMS AND FIRE CENTRAL DISPATCH CENTERS

Introduction

An effective communications system is a basic requirement for effective Emergency Medical Services and Fire Services. There must be a fast, reliable communications system to link the public to the emergency dispatcher, the dispatcher to the ambulance and fire personnel, and the ambulance personnel to the hospital staff.

A Central Dispatch Center is a proven, practical concept that provides fast, reliable communications while efficiently coordinating and managing resources. The purpose of these Guidelines is to assist local agencies in the funding and implementation or upgrading of Central Dispatch Centers. These Guidelines are jointly promulgated by the:

Office of Emergency Medical Services

Office of Frequency Coordination

State Fire Marshal's Office

Goal

The Goal of EMS and Fire Service Communications is the prompt and timely provision of appropriate resources to:

- a) Reduce the deaths, disabilities, pain and suffering experienced by emergency patients and fire victims.
- b) Reduce the damage and losses from fires.

Central Dispatch Centers can contribute to this reduction by utilizing proven concepts and technology to:

- provide improved public access to life-saving services
- permit improved management and utilization of fire and EMS resources
- serve as the focal point for communications during disasters.

Background

Each year, almost 3,000 people die and several hundred thousand more are injured from all types of accidents in New Jersey. In addition, New Jersey experiences over \$109,000,000 of fire losses each year. Lives and property could be saved by reducing the time required for help to reach the scene of an emergency. Although relatively little can be done to reduce emergency vehicle travel time, communications techniques offer substantial opportunities to reduce the total time required for help to reach a citizen.

Most New Jersey citizens in need of emergency services are faced with a bewildering array of different telephone numbers at a time of extreme personal stress. The citizen must know the specific telephone number for the specific municipality to promptly reach assistance. When the citizen does reach the correct agency, the person who receives the call may lack the training to provide adequate advice or to send appropriate assistance.

Central Dispatch Center Function

An EMS and Fire Central Dispatch Center will:

- 1) Provide prompt public access to participating agencies by a single telephone number.
- 2) Screen telephone requests.
- 3) Advise callers as to what to do until help arrives.
- 4) Prioritize requests on the basis on need.
- 5) Promptly dispatch appropriate aid.
- 6) Effectively manage resources.
- 7) Service requests from field units.
- 8) Assist in hospital selection and pre-notification when appropriate.
- 9) Coordinate with other agencies.

Management and Design

A Central Dispatch Center must have the full support of all involved local agencies. Management should be provided by a Board of Directors composed of representatives from participating agencies, the county EMS Council, the county firefighter's association and political sub-divisions.

Policies, Procedures and Task Outlines must be developed to safeguard the interests of all concerned. Clear statements should be included as to when local agencies will be assigned to respond to neighboring jurisdictions. Naturally, the Board should approve the Policies, Procedures and Task Outlines.

Dispatchers must have appropriate training and supervision to ensure their professional growth and development. Adequate telephone service and radio channels should be available to meet the expected busiest hour requirements and to link citizens, EMS and fire personnel, vehicles and medical facilities into a cohesive system.

Dispatch Center Operations

Public Education would be used to inform citizens of how and when to request fire or ambulance service.

Dispatch personnel would have extensive training and be cross trained in EMS and/or Fire Service. Dispatchers would follow Policies, Procedures and Task Outlines and utilize resource and cross reference files approved by the Board of Directors.

When the need arises, a citizen would use the single telephone number to reach the Center. The dispatcher would secure the necessary information and then advise the caller of the appropriate action to take until help arrives. (Depending on local policy, the dispatcher might decline or postpone requests such as a routine ambulance transportation.)

Using the files, the dispatcher would pinpoint the caller's location and, in accordance with local policies, select the appropriate assistance to send. Members of the appropriate fire company(ies) and/or ambulance squad(s) would be alerted at their home or place of business.

Using radios, field units would advise the Center as they began their response, reached the scene, carried out activities and, as necessary, requested additional assistance. As appropriate, the Center would assist ambulances in selecting hospital(s) necessary for patient care and in diverting from "overloaded" emergency departments.

Status Cards, or Computer Aided Dispatch, would be utilized to maintain the current status of every participating fire and ambulance unit. As necessary, and in accordance with local procedures, additional and/or specialized units would be assigned to any incident while other units are moved up, to avoid stripping equipment from a particular area.

Close communications with Police, Civil Defense and neighboring EMS and Fire Services would provide smooth day to day operations and disaster response. Extensive management oversight and evaluation by the Board of Directors would safeguard the interests of participating agencies while ensuring high quality service.

Information Sources

Office of Emergency Medical Services
1911 Princeton Avenue
Trenton, NJ 08648
(609) 392-1180

Office of Frequency Coordination
Box 7068
West Trenton, NJ 08625
(609) 882-1261

State Fire Marshal's Office
State House, 4th Floor
West State Street
Trenton, NJ 08625
(609) 292-3730

Attachment I

GRANT INFORMATION

Available Federal Funds

Effective communications in support of Emergency Medical Services and Fire Services is a National Goal. At present, Federal funds are available to assist in the procurement of EMS related radio equipment for county level Central Dispatch Centers and for participating ambulance services.

There are two sources of Federal funds. Federal Highway Safety funds are provided through the New Jersey Office of Highway Safety. Federal Public Health Services are provided through the New Jersey State Department of Health.

These Federal Funds are coordinated by the New Jersey Office of Emergency Medical Services. The grants are of the reimbursable type. Reimbursement is made only after previously approved expenditures are made. Federal funds requiring a match must be matched by local dollars.

Eligibility and Priority

Both new and existing county operated Central Dispatch Centers, in which the majority of the county ambulance services will participate, are eligible for funding.

Funding priority will be given to:

- 1) New Centers and their participating agencies.
- 2) Existing Centers and their participating agencies.

Grant applications must be supplemented by clear evidence of support and cooperation including:

- 1) Resolution(s) from political subdivision(s)
- 2) Letters of agreement to participate from EMS and fire agencies
- 3) Letters of endorsement from the County EMS Council, County Firefighters Association and other appropriate agencies.

Fundable Equipment

It is essential that a Central Dispatch Center have adequate and appropriate equipment. Federal Highway Safety funds may be available to purchase the following basic equipment.

1. Antenna Tower, when needed.
2. One primary and one reserve radio base station for:
 - a) Each justified EMS Dispatch radio frequency
 - b) EMS Coordination
 - c) Participation in the New Jersey EMS Radio System

3. One primary and one reserve remote control radio console (to control the base stations).
4. One primary and one reserve radio tone group alerting encoder (to alert volunteer members).

Federal Public Health Service funds may be available on a matching funds basis for the following essential adjunct equipment.

1. Twenty track master tape recorder.
2. Instant Playback Tape Recorder for each of three operating positions.
3. Emergency Electrical Generator.
4. Time-date stamp system
5. Teletypewriter with related equipment (for deaf citizen access).

Additional equipment may be eligible for funding if needed and justified. Reserve base stations and other equipment may be used for fire service communications on a secondary basis.

Highway Safety and/or Public Health Service funds may be available on a matching funds basis for the following equipment.

1. Mobile radio for each ambulance, or other vehicle routinely used for EMS, of each participating agency.
2. Three pocket sized radio tone group alerting receivers for each participating ambulance service.

Equipment Specifications and Procurements

The applicant must develop procurement specifications for Central Dispatch Center Equipment. Prior to procurement, specifications must be reviewed and approved by the Office of Emergency Medical Services. "Sole-source" specifications will only be approved when there are justified requirements for compatibility with extensive existing equipment at the Center.

Standard specifications supplied by the Office of Emergency Medical Services must be used for the procurement of other equipment.

All procurements must be made in accordance with Local Public Contract Law and "Sole Source" and "Standard" specifications must be bid separately.

Attachment II

GRANT REQUIREMENTS AND RECOMMENDATIONS

These requirements and recommendations reflect National Standards and the experience of Central Dispatch Centers in New Jersey. The applicant must meet the requirements and address the recommendations within one year of receiving the grant. Non-applicants are encouraged to use these requirements and recommendations to measure and evaluate their operations.

1. Full-Time Operation

The Center must provide continuous, full time service.

2. Management

A "Board of Directors" (or equivalent) must be formally established to manage system operation. The Board must meet regularly and include representatives from participating agencies, the County EMS Council, the County Firefighters Association and political subdivisions. The Board should:

- a) Prepare By-Laws for its own operations
- b) Establish Goals and Objectives for the Center
- c) Approve local Policies, Procedures and Task Outlines
- d) Establish problem reconciliation procedures
- e) Periodically review all aspects of system operation
- f) Issue written reports to all participating agencies on a periodic basis.

Continuous day to day management must be provided. The persons(s) responsible should:

- a) Carry out Policies, Procedures and Task Outlines
- b) Review daily operations
- c) Manage personnel
- d) Submit periodic reports to the Board of Directors.

3. Policies, Procedures and Task Outlines

Written guidance is essential for effective operations and to safeguard the interests of citizens, dispatchers and participating agencies. Since compatibility between all Central Dispatch Centers, Fire and EMS Agencies is essential, the Policies, Procedures and Task Outlines in the New Jersey EMS and Fire Uniform Dispatch Manual should be used. Other Policies, Procedures and Task Outlines specific to each Center must be developed by the Board.

Clear policy statements should be included as to when local agencies will respond to neighboring jurisdictions. The Policies should be clear and concise. Procedures and Task Outlines should be simple, sequential and action oriented. It is strongly suggested that "Playscript Procedure" (Office Publications, Stamford, Connecticut) be used for the format of the Procedures and Task Outlines.

4. Central and Immediate Public Access

It is essential that the general public have access to all forms of Emergency Medical Care and/or Fire Services through a single emergency telephone number. Calling this number would put any person in contact with the Central Dispatch Center. This should be accessible from all telephones, including pay phones where it is preferable that a coin not be required to reach the emergency number.

Ideally, the single telephone number should be 9-1-1 which is the Universal Emergency Number. The applicant must explore the possibility of 9-1-1 service and request the telephone company to conduct appropriate studies. Either 9-1-1 or a county-wide 7 digit Uniform Access Number must be provided for the public to use as the single emergency telephone number. If 9-1-1 cannot be implemented, the Uniform Access Number should have "1212" as the last 4 digits. These last 4 digits are strongly recommended since they are easy to remember, familiar from out-of-area-code-calls-to Directory Assistance and fast to dial on a rotary telephone.

There should be a sufficient number of emergency trunk lines to insure that an emergency caller will not receive a busy signal during normal periods of peak activity. Separate business or administrative trunk lines should be provided to ensure that emergency lines are not tied up with non-emergency calls. The telephone company should be requested to establish procedures to expedite any necessary repairs.

5. Special Public Access

It is essential that deaf persons, non-english speaking persons and motorists be able to secure emergency assistance. The applicant should provide teletypewriter facilities to permit communications with deaf citizens. If the service area contains significant populations or seasonal concentrations of non-English speaking persons, the applicant should strive to:

- a) recruit bi-lingual personnel, or
- b) provide language instruction to dispatch personnel.

Citizen Band Channel 9 should be monitored to receive emergency calls from motorists.

Equipment and facilities to receive non-telephone municipal, central station and proprietary fire alarms should be in accordance with N.F.P.A. Standards. Consideration should be given to the conversion of any existing "pull type" fire alarm boxes to "voice alarm units." Such a conversion could reduce false alarms, permit dispatch of only those fire units which are actually necessary and provide another means for citizens to request EMS.

6. Central Control of Communications: Prompt Dispatching and Direction of Patients to Appropriate Medical Facilities

A single institution must be assigned responsibility for dispatch and coordination of emergency vehicles and services. This involves a trained dispatcher who responds to notification of emergency situations via telephone or radio from private citizens, public agencies, or governmental institutions. The dispatcher should:

- a) Establish priorities and initiate appropriate response of the emergency system. If emergency assistance is needed, this response would include:

- i. dispatch of appropriate emergency vehicles, personnel and equipment;
- ii. communication with those vehicles en route to the scene;
- iii. communication with related agencies when necessary;
- iv. communication with personnel after arrival at the scene to obtain such information as: the types and number of victims, the need for additional vehicles or equipment, and the need for ancillary and backup facilities.

- b) Where appropriate, facilitate communication between ambulance personnel and physicians or other medical professionals.
- c) Where appropriate, based on information received from the scene and from the relevant medical facilities, direct the transport of the patient(s) to appropriate facilities.
- d) Maintain continuous and current assessment of the emergency vehicle status of participating agencies, relevant medical facilities and other resources.
- e) Provide backup response to other agencies involved in disaster situations.

7. Performance Parameters

The public and participating agencies must receive an adequate and appropriate level of service. During normal periods of peak activity the Center should, at least, provide:

- a) Telephone service sufficient to:
 - i. Answer calls on emergency trunk lines within 30 seconds.
 - ii. Answer calls on administrative trunk lines within 60 seconds.
- b) Radio service sufficient to:
 - i. Answer radio calls within 10 seconds.
- c) Efficient operations to insure that the elapsed time - between initial receipt of the request for service and the notification or assignment of a field unit - does not exceed:
 - i. 1 minute for emergency calls.
 - ii. 4 minutes for non-emergency calls.

8. Dispatch Personnel

There should be an adequate number of dispatch personnel to meet performance parameters. Applicants providing fire service dispatching should strive to meet the requirements of Section 2-4. of NFPA Standard No. 73, "Public Fire Service Communications."

All dispatchers must successfully complete the Basic portion of an accredited Dispatcher Training Program and secure a valid third class Radio Telephone Operator's license from the Federal Communications Commission.

In addition, EMS Dispatchers should successfully complete the EMS portion of an accredited Dispatcher Training Program and an accredited Emergency Medical Technician-Ambulance Training Course. Fire Dispatchers should successfully complete the Fire portion of an accredited Dispatcher Training Program and a Basic Firefighting Course approved by the State Fire Marshal.

Adequate supervision should be provided and professional memberships encouraged to insure the dispatchers professional growth and development.

9. Physical Plant

The physical plant should be designed or modified to meet the needs of a modern communications center. There must be adequate space, heating, ventilating and air conditioning for operations and staff amenities. Where feasible, the communications center should be located at the County Emergency Operating Center.

The applicant should strive to meet the requirements of Sections 2-1.1 of NFPA Standard 73. As a minimum, the center must be protected by a fire and smoke detection system approved by the State Fire Marshal. Emergency electrical power must be automatically provided within 10 seconds of any failure of public power supplies.

10. Continuity of Communications

Aggressive loss prevention and security procedures should be carried out to prevent disruption of operations. Facilities, equipment and telephone service should be reasonably secure from physical attack or sabotage and from fire, water, smoke or lightning and other environmental damage. In addition, to regular loss prevention inspections conducted by the Center's staff, the applicant must arrange for quarterly inspections by staff of the State Fire Marshal.

In the event of interior fire alarms, or other threats to Center operations, the on-duty Dispatcher(s) should immediately dispatch or request adequate and appropriate equipment to the Center prior to any other action.

The applicant is strongly encouraged to maintain an alternate communication site or arrange for a neighboring Central Dispatch Center to serve as an alternate site. Ideally, reserve telephone service and base stations should be located at the alternate site. Under normal conditions, these reserve base stations would be remotely controlled from the Center.

11. Record Keeping and Evaluation

Every Communications Center should use an effective and efficient dispatch method to:

- a) Receive and process requests for assistance.
- b) Promptly assign, and record the status of, field units.
- c) Promote the safety of field personnel; and
- d) Permit follow-up and evaluation.

The Status Card method is the only manual record keeping system which meets these requirements. The Center must use either the Status Card Method with time-date stamping or Computer Aided Dispatch. Adequate information should be collected for system operation and evaluation. As a minimum, data sets must be collected as required for:

- a) EMS operations by the New Jersey Office of Emergency Medical Services.
- b) Fire Service operations by the New Jersey State Fire Marshal's Office and NFPA Standard 904.

The Center is encouraged to design or modify its own dispatch cards to collect the minimal data sets or, as an alternative, utilize the New Jersey EMS and Fire Dispatch Card Set.

Telephone and radio conversations must be tape recorded to permit management review and audit using fail-safe continuous equipment. In addition, there should be separate equipment for the instantaneous playback of incoming calls. The confidentiality of tape recordings and of EMS patients must be safeguarded.

Continuous evaluation and management should be provided to ensure that:

- a) System goals and objectives are valid and are being fulfilled.
- b) The public and participating agencies receive quality service.
- c) Grant requirements are being met.
- d) Other phases of system performance are satisfactory.

In addition, the Center should participate in evaluations, including site visits, as requested by State Agencies.

12. Public Awareness

EMS and Fire Services are of little value if the public does not know how or when to access them. The applicant, in cooperation with participating agencies, should develop a plan to inform and educate the public of how and when to access the system. As part of this plan, the applicant:

- a) Must request the telephone company to provide:
 - i. information plaques citing the Center's emergency telephone number at pay telephones;
 - ii. appropriate listings at the front of, in the white pages and in the yellow pages of public telephone directories;
 - iii. appropriate listings in the emergency directory used by telephone operators.
- b) Should strive to distribute telephone stickers for placement on private telephones in homes and businesses.
- c) Should request participating agencies to display the emergency telephone number on their vehicles.

- d) Must inform the public of the use of emergency and administrative telephone numbers.
- e) Should request community agencies, utilities and news media to periodically publish or cite the emergency telephone number and related information.

13. Alerting of Personnel

Volunteer personnel of ambulance and fire services must be promptly alerted to mobilize for emergency calls. Extensive experience has demonstrated that radio tone group alerting is clearly superior to other methods of alerting personnel. The applicant should:

- a) Participate in tone allocation plans with other co-channel radio users to avoid duplication of tones and/or inadvertent activation of receivers of co-channel users.
- b) Encourage participating agencies to procure radio tone group alerting units for all members.

Until the advent of radio tone group alerting systems, sirens or air horns were the only satisfactory means to alert volunteer personnel. Recent studies have clearly demonstrated that the use of sirens or air horns can adversely affect the public health and the social life of the community. During normal periods of operation, sirens and/or air horns must not be used between 1 A.M. and 6 A.M. where all volunteer members of an agency to be alerted have radio tone group alerting receivers. In addition, sirens and/or air horns should not be used at other times where "on-duty" volunteer members are equipped with "pocket sized" radio tone group alerting receivers.

14. Radio Usage

The radio spectrum is a limited natural resource. Radio frequencies must be utilized in accordance with the "New Jersey Medical Service Radio Frequency Plan" and the "New Jersey Fire Service Radio Frequency Plan." All FCC licenses and radio usage of the applicant and each participating agency must be in accordance with the recommendations of the New Jersey Office of Frequency Coordination. This includes, but is not limited to:

- a) Radio Frequency(ies)
- b) Continuous Tone Coded Squelch Frequency(ies)
- c) Effective Radiated Power
- d) Antenna Height
- e) Antenna Type

In addition, all fire radio frequency usage must be as recommended by the New Jersey Coordinator of the International Municipal Signal Association.

15. Radio Tower

Radio coverage, aviation safety and environmental impact are major considerations in locating a radio tower. During preliminary planning, the applicant should

demonstrate the need for, and secure initial approval of any radio tower site, from:

- a) New Jersey Office of Frequency Coordination
- b) New Jersey Division of Aeronautics
- c) New Jersey Environmental Impact Review Section
- d) Local Code Enforcement Officers

16. Inter-Agency Coordination

The Center should maintain strong linkages with:

- a) Fire and/or EMS agencies which do not participate in the Center.
- b) Police Departments
- c) Civil Defense Agencies
- d) Hospitals
- e) Adjacent EMS and Fire Central Dispatch Centers.

The linkages should include interagency exchange of appropriate information, functional integration of daily activities and ensure disaster preparedness. The Center should routinely notify police departments of EMS and fire responses in their area.

17. Insurance Services Office

Applicants which provide central dispatch to fire services should strive to meet any recommendations of the Insurance Services Office. The Board is strongly encouraged to periodically meet with I.S.O. representatives during the planning phases.

18. Mutual Aid and Disaster Plans

The applicant is strongly encouraged to establish written mutual aid agreements with neighboring agencies. Inter agency disaster plans should be developed and periodically tested.

19. Timetable

Implementing or upgrading a Central Dispatch Center is a complex task requiring successful completion of numerous inter-related tasks. The Board should develop a formal realistic timetable which addresses all aspects of the Center's development or improvement.

END