II. Exercise Findings, Conclusions, and Recommendations

A.   Exercise Participation

1.   Findings:

Twenty counties, usually working through their EMS
agency, the Northern California EMS Agency, and all six
of the RDMHCs participated in the hospital bed data
collection communications exercise. Table 6 identifies
these counties and the various means of communications
each used.

Several highly populated counties that could be heavily
impacted by a great earthquake, or who would provide a
substantial number of hospital beds did not participate
in the communications exercise: Alameda, Orange, San
Diego, San Francisco and Santa Clara.

Two of the RDMHCs collected hospital data from their
region and forwarded it to the Authority; four collected
only county data. All of the RDMHCs felt that collection
of hospital bed data could be easily accomplished.

The RDMHCs found the Authority's exercise participation
instructions confusing. This is probably due to the
Authority asking them to collect regional data, yet still
going ahead and collecting data directly from counties
who wished to send it. The Authority's intent in
directly collecting data was to determine if counties in
a disaster area had communications available if the RDMHC
did not.

The Office of Emergency Services provided radio
communications at the request of several county EMS
agencies. OES Headquarters commented that the Authority
had not informed them of the exercise. The Authority
expected local EMS agencies to contact their local OES
office to make arrangements for communications if they
needed them, and that such arrangements did not require
participation by OES regions. Generally, this
arrangement worked well. However, there was some
confusion among local EMS agencies as to why the
Authority seemed to be establishing a communications
network separate from OES'.

In addition to establishing radio contact with twelve
counties, the CARES radio station in Sacramento
established contact with the following: Chico Blood
Bank, California Blood Bank System, Houchin Community

3

PARTICIPANTS IN COMMUNICATION HOSPITAL BED EXERCISE

COUNTY	PARTICIPATE		Tele-Phone	Radio			Computer			
	No	Yes		VHF/UHF	HF	Packet	PROFS	EMSA-Net	Modem	FA
North Coast										
Nor. Cal.		X		X			X			
Sierra-Sac.										
Alpine M.L. San Joaquin										
Inland Counties										
Central Coast										
Alameda										
Alpine										
Amador										
Butte										
Calaveras										
Colusa										
Contra Costa		X		X				X		X
Del Norte										
El Dorado										
Fresno		X		X		X	X	X		
Glenn										
Humboldt										
Imperial										
Inyo										

MEANS TO COMMUNICATE

| | PARTICIPATE | | Tele-Phone | Radio | | | Computer | | | |
NTY	No	Yes		VHF/UHF	HF	Packet	PROFS	EMSA-Net	Modem	FAX
n		X		X	X					
gs		X								
e										
sen										
Angeles		X						X	X	X
era		X								
in		X						X		
iposa		X								
docino										
ced										
oc										
o										
terey										
a		X	X	X	X	X	X	X		
ada		X		X						X
nge										
cer										
mas										
erside		X		X	X					X
ramento		X					X			X
Benito										
nardino		X		X	X					X

COUNTY	PARTICIPATE		MEANS TO COMMUNICATE							
			Tele-Phone	Radio			Computer			
	No	Yes		VHF/UHF	HF	Packet	PROFS	EMSA-Net	Modem	FA
San Diego										
San Francisco										
San Joaquin										
San Luis Obispo		X		X	X		X			
San Mateo		X							X	X
Santa Barbara				X	X					
Santa Clara				X						
Santa Cruz		X	X		X	X				X
Shasta				X						
Sierra										
Siskiyou										
Solano										
Sonoma										
Stanislaus		X	X							
Sutter										
Tehama										
Trinity										
Tulare		X	(Provided Mailed Information About Beds)							
Tuolumne										
Ventura		X		X	X					

COUNTY	PARTICIPATE		Tele-Phone	Radio			Computer			
	No	Yes		VHF/UHF	HF	Packet	PROFS	EMSA-Net	Modem	FAX
Yolo		X	(Not Alerted -- Did Not Send Data)							
Yuba										
TOTALS		20	2	12			6	6	1	8
RDMHCs										
Contra Costa		X						X		X
San Luis Obispo		X		X	X		X			
Sacramento		X					X			X
Fresno		X		X		X	X	X		
San Bernardino		X		X	X					X
Nor. Cal.		X		X			X			

MEANS TO COMMUNICATE

Blood Bank, Alameda Blood Bank, Fresno Blood Bank, Delta
Blood Bank, Merced Blood Bank, Peninsula Memorial Blood
Bank, Sacramento Blood Bank, OES in Sacramento and
Redding, DHS Berkeley Public Health Laboratory, DHS West
Berkeley Toxic Materials Laboratory, DHS in Fairfield,
Sacramento City Communications Reserve, Kaiser Permanente
Hospital in Oakland, UC Davis Medical Center, Merced
Community Medical Center, Diablo Red Cross, US Bureau of
Reclamation, California State University at Sacramento
Amateur Radio Club, and the Contra Costa County Fire
District.

2. Conclusions:

    a. A total of twenty counties and twenty-two public and
        private agencies participated in the communications
        exercise. Participation by the Red Cross and the
        Blood Banks improved access to these critical
        portions of the response system. RDMHCs'
        participation demonstrated that their communication
        system could provide critical coordination in a
        disaster. In terms of overall participation, the
        communications exercise was successful.

    b. The need to augment OES' communications capabilities
        by establishing an independent means for
        communicating medical and health related data
        directly to the Authority is not well understood by
        many counties.

3. Recommendations:

    a. Large counties that could either be impacted by a
        major disaster or who have a large number of hospital
        beds within their jurisdiction that could receive
        victims should be encouraged to participate in future
        exercises. Experience with the various
        communications systems that the Authority expects to
        use is critical.

    b. County EMS agencies need to understand the limits of
        OES' disaster communications capabilities relative to
        critical medical response time limits.

    c. OES headquarters should be notified of EMS
        communications exercises. Care should be taken to
        ensure that the EMS communications needs are
        coordinated with OES communications capabilities.

B. Hospital Bed Availability

If none of the hospital beds were damaged in the State, a
significant portion of the state's 86,000 hospital beds would
be available for victims. Unfortunately, in the disaster
area 9% - 13% of the hospitals would experience structural
damage, and 36% - 41% would have less significant
structural, equipment, or utilities damage. Clearly,
additional hospital beds located in other portions of the
state would be needed to care for stabilized casualties
requiring hospitalization.

The Authority has established a regionalized system for
locating available hospital beds. Stabilized casualties
requiring evacuation will be classified according to the
military's ASMRO system (attached). Data on hospital bed
availability must be matched with evacuation needs by the
Authority so that casualties can be flown to the appropriate
destination. In order for this system to work, counties have
been requested to poll their hospitals using the ASMRO
categories or characterize the beds accordingly, and
communicate this data to their RDMHC or directly to the
Authority. In turn, the Authority must be able to tell them
how many casualties they will receive by category and where
and when they will arrive.

The Authority used two methods to collect hospital bed
availability data:

o   A mail survey of each county to determine: Suitability
    of the ASMRO reporting categories to report data; method
    of communicating data, and time required to collect the
    data; and,

o   Various radio, computer, and voice communications to
    report hospital beds by ASMRO or other category during
    the exercise.

1. Findings

    a. Hospital Bed Reporting Mail Survey

        A mail survey form requesting hospital bed data
        (Attachment 2) was mailed to all fifty-eight County
        Health Officers and EMS agencies. Twenty-two
        counties (36%) returned completed surveys (Ventura,
        San Bernardino, Santa Barbara, San Luis Obispo, Mono,
        Modoc, Los Angeles, Contra Costa, San Mateo, Nevada,
        Shasta, Amador, Stanislaus, Tuolumne, Santa Cruz,
        Napa, Yolo, Sacramento, Monterey, San Joaquin,
        Riverside and Kern). Two counties reported their
        data on one form, so data is reported for twenty

counties below. Follow-up reminders and surveys have been sent to the remaining thirty-eight counties.

Table 7 reports the number and the percent of counties indicating that they use, do not use, or could use the ASMRO hospital bed reporting categories.

(Table 7)
COUNTIES REPORTING USE OF ASMRO HOSPITAL
BED CATEGORIZATION

(Neither columns nor rows total 100% because
not all counties reported for all categories
or reported in more than one column)

Patient Category	County Uses	County Does Not Use	County Can Use
1. Medical	9 (45%)	10 (50%)	6 (30%)
2. Psychiatry	7 (35%)	13 (65%)	5 (25%)
3. Surgery	14 (70%)	11 (55%)	5 (25%)
4. Orthopedic	5 (25%)	13 (65%)	8 (40%)
5. Spinal Cord Injury	2 (10%)	16 (80%)	5 (25%)
6. Burns	2 (10%)	16 (80%)	6 (30%)
7. OB/GYN	10 (50%)	10 (50%)	5 (25%)
8. Pediatrics	10 (50%)	10 (50%)	4 (20%)

In some cases, counties checked the "does not use" category because they do not have hospital beds that could be categorized this way. Space was provided for listing other bed reporting categories. Those listed included: Intensive care, medical/surgical,

immediate, delayed, emergency pediatric Intensive care unit (ICU), walking wounded, adult ICU, immediate trauma, delayed trauma, minor trauma, and coronary care.

Generally, a majority of counties do not use the ASMRO hospital bed reporting categories. However, interviews with exercise participants indicated that they could use them for casualty assignment purposes.

Data was collected on the communications system that counties use to collect hospital bed availability data. More than one means of communication could be checked. Table 8 reports this data.

(Table 8)
COMMUNICATIONS METHODS USED TO REPORT
HOSPITAL BED DATA TO COUNTIES

Radio by voice	10	(50%)
Digital radio	1	(25%)
Regular telephone	19	(95%)
Dedicated telephone	4	(20%)
Direct computer line to each hosp.	1	(5%)

Virtually all counties use the public telephone system to collect hospital bed data. The primary backup system appears to be radio for half of those surveyed. Disruption of the day-to-day telephone service could make it very difficult to gather this critical data.

Counties were asked to report the time it takes to determine hospital bed availability for the entire county. Table 9 reports the survey's findings.

7

(Table 9)
TIME REQUIRED BY COUNTIES TO COLLECT
HOSPITAL BED AVAILABILITY DATA

Less than 30 minutes	8	(40%)
One hour	10	(50%)
One hour, 30 minutes	1	(5%)
Two hours	1	(5%)

The data shows that 95% of the hospital bed data will
be available within two hours following the
occurrence of a major disaster.

b. Hospital Bed Availability Reported During the
    Exercise

    Counties were asked to report the hospital bed
    availability for the day of the exercise or to
    provide an accurate estimate of what it would be.
    Hospitals were not asked to determine bed
    availability after they discharged non-critical
    patients or made any other special efforts to
    identify vacant hospital beds. Twenty counties
    reported hospital bed availability data: Los
    Angeles, Marin, Napa, Contra Costa, Sacramento,
    Fresno, Riverside, San Luis Obispo, Santa Barbara,
    Ventura, San Bernardino, San Mateo, Nevada, Santa
    Cruz, Stanislaus, Kern, Kings, Madera, Mariposa, and
    the Northern California EMS Agency. Table 10 reports
    this data by ASMRO category.

(Table 10)
HOSPITAL BED AVAILABILITY
AS REPORTED BY TWENTY COUNTIES
ON APRIL 6, 1989

Region/County and ASMRO Category	Number of Hospital Beds
A. Northern California (Kern County and all counties North)	
1. Medical	1,023
2. Psychiatry	192
3. Surgery	287
4. Orthopedic	92
5. Spinal Cord Injury	11
6. Burns	9
7. OB/GYN	306
8. Pediatric	202
9. Other Classification	161
Regional Total	2,283
B. Southern California (South of Kern County)	
1. Medical	1,592
2. Psychiatry	510
3. Surgery	1,551
4. Orthopedic	549
5. Spinal Cord Injury	867
6. Burns	520
7. OB/GYN	666
8. Pediatric	604
9. Other Classification	119
Regional Total	6,978
Overall Total Beds	9,261

The data shows that 9,261 hospital beds were available in twenty counties to receive disaster casualties. This represents about 11% of the total hospital beds in the state. There are probably considerably more available, given that San Diego, Orange, San Francisco, Alameda, and other counties with a significant number of hospitals did not participate. A disaster in either region would significantly reduce the state's resources requiring evacuation of casualties to other parts of the nation.

2. Conclusions:

   a. While a majority of counties do not use the ASMRO hospital bed reporting categories, most feel that they could. Ninety-two percent of the counties can collect this data in two hours or less. However, it may be difficult to obtain a significant amount of hospital bed availability data if the public telephone system is disrupted by a major disaster.

   b. If this capability to generate hospital bed availability data is characteristic of other counties throughout the state, then the Authority should experience little difficulty in obtaining this information.

   c. There appears to be sufficient immediate hospital bed capacity to absorb a significant number of stabile casualties immediately after a disaster. Discharge of patients who are not critically ill would considerably increase this capacity.

3. Recommendations:

   a. Counties that lack a backup communication system that is not dependent on day-to-day telephone service should consider installing one.

   b. Data on hospital bed capacity should be collected from counties that did not participate in the exercise so that an accurate picture of California's capacity to care for casualties can be developed.

C. Accuracy of Hospital Bed Availability Data Provided By
    Various Communications Systems

    This section of the report will examine the accuracy of the
    data communicated.

    1. Findings:

        Voice, computer data, and FAX are the major
        communications systems used during the exercise.
        Generally, each system provided usable data for
        determining hospital bed availability.

        a. Voice Data Communications

            Voice communication using telephone or radio was too
            slow to keep up with the volume of traffic, and was
            less accurate than the other methods. For example,
            the exercise time period set aside by CARES was
            entirely taken up with voice check-ins, and providing
            data on communication systems. It was impossible to
            test Packet or to receive hospital bed data. A
            comparison of data recorded by voice with FAX and
            computer communications identified errors in the
            messages received by voice.

        b. Computer Data Communications

            Both the Health and Welfare Agency Data Center PROFS
            system, and the EMSA Information Net provided
            accurate, timely data. The PROFS system did not
            provide a means for summarizing the data into a
            single report (this capacity was not developed for
            the exercise but could be readily provided). In
            contrast, the EMSA Information Net did summarize the
            data but in a form that made it difficult to
            determine which county or RDMHC had provided the
            data. A second try at summarizing data duplicated
            the bed count from one county by including two
            messages in the total.

        c. Radio Data Communications

            As noted, a large number of amateur radio stations
            representing various public and private agencies
            participated in the exercise. Communications
            capability data was collected by voice from each.
            This data was felt to be useful and accurate by
            CARES. Unfortunately, there was insufficient time to
            test Packet communications (an exercise to test this
            capability has been scheduled). The single voice

11

radio communication of hospital data contained two
significant errors.

d.   FAX Machine

FAX machines provided accurate copies of hospital bed
availability data. This information provided the
standard against which the other systems were
measured.

e.   Computer Modem

One county used a computer modem and telephone lines
to communicate directly with the Authority. The data
provided was comparable in quality to that
communicated over other systems.

2.   Conclusion:

Computer data communications and FAX provided the most
accurate hospital bed availability data. Radio voice
communications were time consuming and, while not
consistently accurate, provided useful information.

3.   Recommendations:

a.   Computer data communications and FAX capabilities
over dedicated telephone lines (not voice) should be
developed as the primary communications system for
gathering hospital bed availability information.

b.   A secondary backup computer (mail box and/or modem)
and FAX system should be developed to use day-to-day
telephone lines.

c.   Voice radio communications should be available to
support these systems and to provide a final level of
redundancy should these two systems fail, or to
communicate with counties who do not have this
capability and cannot communicate by telephone.

d.   Packet radio communications should be tested to
determine if a significant number of counties or
other agencies (more than ten) can use this system to
communicate data in a timely and accurate manner.

D. County Communications Systems Capabilities and Their
   Operation During the April 6th Exercise

   1. Communications Systems Capabilities

      A survey to characterize communications capabilities was
      mailed out with the hospital bed survey. Particular
      attention was paid to amateur radio. Twenty counties
      returned the survey (Ventura, San Bernardino, Santa
      Barbara, San Luis Obispo, Mono, Modoc, Los Angeles,
      Contra Costa, San Mateo, Nevada, Shasta, Amador,
      Stanislaus, Tuolumne, Santa Cruz, Napa, Yolo, Sacramento,
      Riverside, and Kern).

      a. Findings:

         The survey asked who coordinated the emergency
         communications system. All twenty of the respondents
         said that they have a disaster medical response
         coordinator. Twenty percent were able to name their
         data processing system manager. (This individual is
         important for establishing computer communications.)
         Twenty percent (20%) were able to identify their
         county communications director or manager.

         Counties were asked to identify EMS emergency
         communications systems. Table 11 reports this
         information by type of communications system. More
         than one alternative could be checked.

                          (Table 11)
                   MEANS OF EMS EMERGENCY
              COMMUNICATIONS AVAILABLE TO COUNTIES

Amateur Radio	14	(70%)
Dial-up Modem	11	(55%)
FAX Machine	12	(60%)

         Aside from telephones, the majority of reporting
         counties have amateur radio communications
         capabilities. Half have computers with modems
         capable of either direct computer-to-computer
         communications, or connection with a telephone system
         mailbox, including PROFS.

                              13

The CARES station conducted their own on-the-air
survey of equipment (transmitters, antennas, computer
capability, phone patch, etc.) and station operating
protocols. This data is available from them.

Thirteen out of the twenty counties reporting said
that a radio amateur club associated with RACES or
ARIES would operate their radio communications. The
number of personnel that would respond varied from
two to forty-eight, averaging about twenty-five. The
actual number of operators may be far less if each
has multiple responsibilities, for example to the Red
Cross and EMS. Interestingly, the largest counties
did not always have the most licensed amateurs ready
to respond.

The location, ownership of equipment, and its
frequency coverage are all critical to how rapidly a
communications system can be established and
maintained. Table 12 summarizes this data.

(Table 12)
OWNERSHIP, FREQUENCY COVERAGE, AND LOCATION
OF EMERGENCY RADIO EQUIPMENT

1. Ownership of Equipment	N	%*
a. Responding organization has its own dedicated equipment	11	(55%)
b. Use equipment provided by county or OES	8	(40%)
c. Depend on responders personal equipment	8	(40%)
2. Frequency Coverage		
a. VHF	12	(60%)
b. UHF	9	(45%)
c. HF	9	(45%)
3. Location of Emergency Radio Equipment		
a. County EOC	12	(60%)
b. OES	5	(25%)
c. Medical/Health EOC	3	(15%)
d. Private Residence	7	(35%)
e. County Communication Center	2	(10%)

* Percent of total respondents.

A little over half of the respondents have their own
dedicated equipment with the remainder depending on
OES. Both groups, but particularly the former,
expect the responding radio amateurs to bring their
own equipment to augment that provided by government.
Most of the stations are located in government
agencies with a few at private residences.

Frequency coverage appears to vary from station to station. The dependance on VHF and UHF indicates that repeaters are a very important for long range communications. Nine of the counties (45%) reported that they have access to a repeater. Should a disaster occur in their area, 45% would use VHF as their primary communications frequency, with 25% using UHF, and 15% HF.

Packet radio is an important method for communicating digital computer data. Twenty-five percent of the respondents indicated that they have this capability and were part of a Packet mailbox system.

Competition with other county agencies for communication time would be a serious problem for medical communications. Table 13 reports which other public or private agencies plan to use the medical responders radio system.

(Table 13)
MULTIPLE AGENCY USE OF AMATEUR RADIO COMMUNICATIONS

In addition to EMS, the following agencies expect to use the same amateur radio equipment:

1. Fire Service	11	(55%)
2. Law Enforcement	9	(45%)
3. Transportation	7	(35%)
4. Red Cross	10	(50%)
5. Social Welfare	8	(40%)
6. Other (schools, cities, and hospitals)	7	(35%)

Clearly, amateur radio communications will play a pivotal role if telephone and other communications systems fail. Multiple agencies plan to use this resource. It is particularly interesting to note that the fire service, law enforcement, and transportation, all of whom have their own dedicated systems, plan to use amateur radio.

b. Conclusions:

    (1) After telephone, amateur radio communications are the primary means of emergency communications available to counties.

    (2) Ability to work VHF, UHF, and HF varies by county; some can communicate on all frequencies, others only on one or two.

    (3) Government agencies own most of the equipment, but depend on amateurs to operate and supplement it with their own equipment. EMS must depend on OES amateur radio equipment in a number of cases and will have to compete with other agencies for access to it.

    (4) Only one-fourth of the counties had digital radio communications. The possibility for error and slow rate of information communication by voice could slow the acquisition of hospital bed data.

c. Recommendations:

    (1) Counties should determine how many different agencies plan to use amateur radio for critical communications. An estimate of the amount of traffic they plan to send and other similar information would help to determine if their current resources are adequate. This assessment should also consider the advantages of digital communications over voice.

    (2) Given the wide mix of operating frequencies, OES and CARES should consider encouraging local radio clubs to establish UHF and VHF repeater networks that connect with Sacramento.

    (3) The Authority should continue its efforts to establish its own emergency mobile repeater system.

    (4) Continue to develop multiple means of communication.

2. Amateur Radio Exercise Operations

With the assistance of CARES, the Authority established specific operating frequencies for the exercise: 7.235 Mhz for voice and 7.085 Mhz for data for Southern California; and, VHF 147.195+ (repeater) voice

(Sacramento) and VHF 147.735- (repeater) voice (Bay area). Specific times for reporting in and conducting tests were established.

CARES has prepared its own after action report, "Amateur Radio Communications Report EMSA Hospital Bed Availability Exercise" (Attachment 4). Several of the points made there will be summarized and additional comments made.

a. Findings:

The CARES station does not have enough operating positions or access to antennas to effectively operate on more than one frequency at a time. (The Authority has sought to address this problem by submitting Budget Change Proposals for equipment, and by encouraging the Department of Social Services [DSS] to move the station to a more favorable location.) For this reason the Sacramento Communications Reserve was requested to establish a second station that would operate on VHF.

The second station operated for a little over an hour. Difficulties were experienced with establishing communications between the station and participating counties. Several lessons were learned during the course of the auxiliary station's operation:

(1) Operational peculiarities were experienced due to the proximity of the station to the Pac Bell building, a source of a very high level of RF interference.

(2) Some of the difficulties experienced may have been due to the operator's lack of familiarity with the equipment. No operational manuals were available at the site.

(3) A critical piece of digital communications equipment may have been damaged during transport from the operator's home. This shows how vulnerable emergency communications are to equipment failure when equipment must be brought to the station.

(4) With only one antenna available, the ability to conduct simultaneous VHF voice, VHF digital, and UHF transmissions was limited.

(5) Efforts by stations to use VHF to contact
    Sacramento were unsuccessful after 10:30 A.M. due
    to station problems already identified.

The main CARES station, located in the basement of
the Department of Social Services (DSS) building,
handled both VHF and HF communications. The exercise
led to the following findings:

(1) Twice as many station check-ins occurred than
    expected. Nearly all of the exercise time was
    taken up with collecting essential station and
    administrative information from each station by
    voice, leaving little time for either voice or
    digital traffic about hospital bed availability.
    Nine radio operators did receive hospital bed
    availability data from their counties.

(2) Net participants complained that there seemed to
    be little going on, aside from the check in
    process. Many would have preferred to pass
    additional traffic by voice and Packet.

(3) Each of the preassigned HF frequencies worked
    well. Little interference was experienced in
    Sacramento. However, the San Bernardino station
    did experience transmission difficulties and had
    to relay their traffic through Barstow.

(4) Participating stations maintained excellent
    operating procedures, allowing the net to proceed
    in a smooth and orderly manner.

(5) Efforts by the Authority to contact the station
    by telephone were unsuccessful. Operators had
    little time to answer the telephone.

The 147.735 Mhz San Francisco repeater worked well
for establishing communications with the Bay area.
However, these repeaters are privately owned, and
their operators are becoming reluctant to loan them
for disaster exercises. Both local and state
exercises are overloading this scarce resource. In
any case, should a disaster occur, these repeaters
will probably be quickly overloaded by local traffic
and not be available to CARES. Such a problem
occurred in the 1987 OES earthquake exercise when
State agencies overloaded a repeater for
communications into the San Joaquin valley from Los
Angeles. CARES was unable to gain access as needed.

Several counties requested OES to assist them with radio communications. As noted, a significant proportion depends upon OES for emergency communications. Most local agencies view the State emergency response as monolithic and wondered if this was a State OES exercise.

b. Conclusions:

(1) Generally, the amateur radio portion of the exercise met all of CARES objectives, and most of the Authority's objectives. Station staff planned to communicate with sixteen stations, but ended by making thirty-five contacts on various frequencies. Virtually every portion of the HMW Net participated. Data was collected by voice on each station's equipment, operational procedures, and staffing. A limited amount of prearranged traffic was passed between the stations.

(2) Due to the unexpectedly large number of participants and some equipment problems, Packet traffic on hospital bed availability was not passed. An exercise has been planned for a later date to accomplish this objective.

(3) The time consuming collection of station information by voice demonstrated the need to continue to develop computer-based Packet operations.

(4) The lack of operating positions and limited antenna access restricted the ability of the main CARES station to handle a large volume of traffic. Efforts to establish a back-up station met with limited success.

(5) Increasing use of privately-owned repeaters for emergency traffic and exercises may overwhelm this privately-owned resource. Should a disaster occur they may not be available to CARES as demonstrated in the 1987 OES exercise.

(6) The ATS-3 satellite system was not operated during this exercise. Lack of time, limited operator training, and difficulty in setting up the fragile antenna system accounted for this.

c. Recommendations:

(1) The number of operator positions, antenna connections, and other communications-related needs of CARES should be addressed by the Authority, DHS, and DSS. At a minimum, the station should be moved to larger quarters with improved access to existing antennas. Antenna systems should be installed allowing communications on at least two VHF and one UHF channel simultaneously.

(2) Counties and State OES should be encouraged to install Packet capabilities in their emergency amateur radio stations. A personal computer and software should be dedicated to the CARES operations.

(3) State disaster communications should not depend on private citizens bringing or donating their own equipment. Difficulties with transport, inability of other operators to train on it, inability to pretest it at the site, lack of availability of privately-owned repeaters, and other problems could severely jeopardize critical medical communications.

(4) The Authority has attempted to obtain funding for an independent medical communications repeater system in the past. Consideration should be given to reviving these efforts, with particular emphasis placed on building and deploying mobile emergency solar powered VHF and UHF repeaters in critical areas.

(5) After a number of HF exercises, CARES has concluded that emergency digital communications must be coordinated on voice channels. Preassigned digital frequencies should be dropped. Any digital operations will be agreed to on voice frequencies after determining a clear digital frequency.

(6) The net control station, CARES, should give instructions to establish several relay stations so that check-ins can be run concurrently if there is a great deal of traffic.

(7) Experiments by EMSA and CARES to integrate radio and dedicated computer telephone line communications should be operational as soon as possible.

(8) Communications exercise scenarios developed by EMSA and/or CARES should include a sufficient number of problems and messages to keep participants interested. Such activities should be realistic.

(9) CARES should exercise the HMW Net frequently enough to maintain the skills and interests of its participants. Such exercises should be held independently of, and in addition to, those developed by the Authority or other Health and Welfare Agencies.

(10) The Authority should continue its efforts to obtain a reliable, easy to operate, portable satellite communication capability.

3. Computer-Based Communications

Four computer-based communications systems could be used for disaster communications:

a. State data center digital communication via dial-up modem and dedicated terminal;

b. Dial-Com Public Health Computer Network;

c. EMSA-Information Net; and,

d. Direct PC-to-PC communications via telephone modem or Packet.

Aside from "d", none of the computer-based communications had been used for disaster communications prior to this exercise. Only the systems under State supervision ("a", "c", and "d") were used for the exercise. Each will be discussed in turn.

a. Health and Welfare Data Center PROFS

The Health and Welfare Data Center has more than 10,000 terminals, connected by dedicated telephone lines, all over the state. These terminals, while managed by the Data Center, are under the direct control of agency departments (the Department of Social Services and Employment Development Department, among others).

The closest terminal to a particular RDMHC's office or EOC was identified by the Data Center. Arrangements in its use were made with the department that controls the terminal.

Working with the Authority, the Data Center developed a very simplified mail box menu and hospital bed availability form (Attachment 4). An instructional package was prepared and identification codes created and distributed. The RDMHCs and the Authority participated in this portion of the exercise.

(1) Findings:

Demonstration of the usefulness of PROFS for disaster communications resulted in the following:

(a) Written instructions were completed by the data center two days before the exercise was scheduled to start. Delays in "overnight" mail made it impossible to actually test and practice the system prior to the exercise.

(b) Some difficulties were experienced in identifying terminals close to the user due to the way the Data Center keeps its records. Two of the RDMHCs could not participate because of this problem.

(c) The Authority staff attempted to give PROFS operating instructions over the telephone. These instructions were incomplete and resulted in increased confusion.

(d) Delays were experienced with dial-up access to PROFS by the Authority (it took 45 minutes to send the exercise start-up message).

(e) The day-to-day terminal users, in some cases, did not know that they are part of the Health and Welfare Data System. They were unable to bring up the appropriate screen to initiate PROFS communications. In some cases, they made assumptions that were appropriate for their system, but that did not work for the one specially created for the exercise.

(f) The Data Center was immediately available by telephone to answer operational questions. This excellent support made the system work.

(g) Once the RDMHC staff person gained access to the system and the main menu, they found it easy to use. Data was entered and sent to the Authority. Generally, users felt that the system demonstrated its value for emergency communications.

(h) The terminals are only available during normal working hours. The use of existing terminals close to EOCs or the EMS agency offices was adequate but required a staff person to go from the office to the terminal to enter the data.

(2) Conclusions:

(a) The exercise demonstrated that the PROFS system can be used to communicate important disaster-related information.

(b) Difficulties experienced were primarily concerned with access to the terminal and to PROFS. Once these problems were dealt with, the data was easy to enter and send to the Authority.

(c) Terminal location may be a problem during a disaster. Working hours and physical location away from the EOC reduces their value to the local EMS agency.

(3) Recommendations:

(a) The Authority should work closely with the departments that actually operate the terminals to explain the importance during a disaster, and to train their staff in how to access the appropriate starting point of the PROFS system.

(b) The Data Center should consider a means for automatically activating specific terminals with the appropriate PROFS starting point and a notice that the terminal is being reserved for disaster communications for a particular agency. Operating instructions should be included on this initial screen.

(c) The Authority should identify a means for providing voice communications by telephone and radio or some other means between the

Data Center and a disaster terminal user, so that operating problems can be quickly resolved.

(d) Additional dial-up ports should be identified by the Data Center for exclusive Authority use during a disaster.

(e) The cost of installing a dedicated telephone line and terminal in each RDMHC's EOC should be developed by the Data Center.

(f) The Data Center and CARES should conduct communications experiments to develop an automated radio-PROFS link.

(g) EMSA/Data Center/RDMHC practice sessions should be scheduled at least twice a year.

b. EMSA Information Net

The Marin County EMS Agency, who manages the EMSA Information Net, developed a special screen for recording hospital bed availability data. Data was sent to the Authority on a summary sheet.

(1) Findings and Conclusions:

The system worked well. No complaints were received about gaining access to it. As noted, the data summary sheet needs to be improved. Excellent support was provided by the Marin County EMS Agency.

(2) Recommendations:

All EMS agencies located in counties with a significant number of hospital beds or volunteer medical personnel should be encouraged to subscribe to the system. Practice sessions should be conducted with the Authority/county EMS agencies/RDMHCs at least twice a year.

c. Computer-to-Computer Modem Communications

Only one county used this means of communication. It requires familiarity with computer communications software and depends on regular telephone lines. Voice communications capability is necessary for coordination. This means of communication worked and should be considered a viable backup to systems that can handle a greater amount of traffic.