

SUMMARY CHRONOLOGY -- NATIONAL POLICY FOR  
"911" EMERGENCY TELEPHONE NUMBER

1. February 1967: Concept of signal police telephone number recommended by the President's Commission on Law Enforcement and Administration of Justice.
2. 1968: AT&T proposed 911 to FCC as the single emergency number (police, fire, rescue, etc.) and made it available for nationwide use.
3. 1968-1973: The concept was studied, conferenced and debated by industry, government and others.
4. 1973: 200 communities served by 911 service.
5. March 21, 1973: OTP issued national policy statement (Bulletin 73-1) designating "911" as nationwide emergency telephone number (police, fire, rescue, etc.).
6. May 1973: OTP published "911," "A Handbook for Community Planning" (this is in its third reprint by GPO) cost \$1.35, Stock No. 2205-0003.
7. January 1973: "911" service made an integral part of The Emergency Medical Services Systems Act of 1973.
8. September 1974: 457 communities served by "911" service, an increase of 220% since issuance of "911" policy (less than two years).

9. February 1975: Three states, California, Florida, and Louisiana have enacted statewide "911" legislation.

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# THE CHALLENGE OF CRIME IN A FREE SOCIETY

A REPORT BY THE PRESIDENT'S COMMISSION ON LAW ENFORCEMENT AND ADMINISTRATION OF JUSTICE



FEB 1967



*Burglary suspect triggers hidden camera and alarm.*

#### DETECTION BY ALARMS AND SURVEILLANCE DEVICES

Devices for sounding an alert with no human intervention would have advantages both as a deterrent to criminals and in facilitating the response to an incident. Many devices are available: silver-tape electric alarms, pressure and acoustic sensors, radar, and ultrasonic, infrared, and ultraviolet beams. These devices can protect unattended premises from intrusion by detecting movement in a room or motion across a perimeter.

False alarms are a problem for any alarm system. In Washington, D.C., in 1965, 4,450 alarms were received by the police; 98 percent of them were false. Since answering each false alarm takes an average of about 30 minutes and since patrol cars tend to spend about half their time answering calls, this was approximately equivalent to full-time duty of one patrol car.

New, low-cost private alarm systems are being developed and may become widely installed. These devices can automatically send prerecorded messages directly to the police. As a consequence, the police should expect a significant increase in the number of false alarms. To prevent this increase from seriously disrupting police operations, police departments should establish minimum standards for direct-calling alarm installations. On-site inspection should be required to assure that the alarm itself is mechanically and electrically reliable (usually not a serious problem), that its installation is not subject to simple accidental failure as from blowing wind, and that it is not subject to accidental triggering by the occupants.

Various kinds of street alarm or surveillance networks have been proposed to detect crime in the streets. The proposals range from simple pushbutton alarms to sophisticated pattern-recognizing devices that detect cries of "help." Other sensors include closed-circuit TV cameras (fed to a console at the police station), simple microphones, and magnetic sensors triggered by specially coded devices carried by individuals. To explore these suggestions, the task force has examined several system designs. The automatic systems cost over \$1 million per square mile, far too much for most communities. Furthermore, they may pose an insoluble false-alarm problem and so

are not recommended. Accessible street emergency communication facilities, discussed below, can serve many of the same functions, and can be developed much more readily.

#### COMMUNICATIONS TO THE POLICE

The apprehension process can respond only after it gets a call, and a number of things can be done to modify existing street communications equipment to make it easier for a victim or a witness to reach the police.

The victim of a robber careful enough to steal the last dime cannot now use the public telephone. Public telephones can be adapted so that the operator can be reached without using money, as was demonstrated in a recent test in Hartford, Conn. The Bell Telephone System is now planning to extend this capability widely.

Most major cities have a network of police callboxes that are usually inconspicuous and locked. Washington, D.C., has 920 such boxes, or about one every one-fourth mile. During World War II these boxes were painted red, white, and blue, and made available to the public in case of air raids and other emergencies.

#### *The Commission recommends:*

Police callboxes should be designated "public emergency callboxes," should be better marked and lighted, and should be left unlocked.

The false-alarm rate for such callboxes would probably be far less than from a mechanical alarm, since a potential prankster would have to reveal his voice. While experience with a police callbox may not turn out to be fully comparable, one metropolitan fire department estimates the false alarm rate for calls received over the telephone to be less than 3 percent, far less than the false-alarm rate for an automatic or a mechanically-actuated alarm.

In trying to call the police from an ordinary telephone, a person may be bewildered by the many police jurisdictions and the various telephone numbers associated with them. In the Los Angeles area alone, there are 50 different telephone numbers that reach police departments within Los Angeles County. It should be possible to have a single telephone number to reach the police directly. England has such a universal emergency number.

#### *The Commission recommends:*

Wherever practical, a single police telephone number should be established, at least within a metropolitan area and eventually over the entire United States, comparable to the telephone company's long-distance information number.

This is difficult but feasible with existing telephone switching centers; it appears practical with the new electronic switching systems being installed by the Bell System, and should be incorporated. In the interim,

telephone companies should print on each telephone number disc the number of the police department serving that telephone's location.

#### COMMAND AND CONTROL

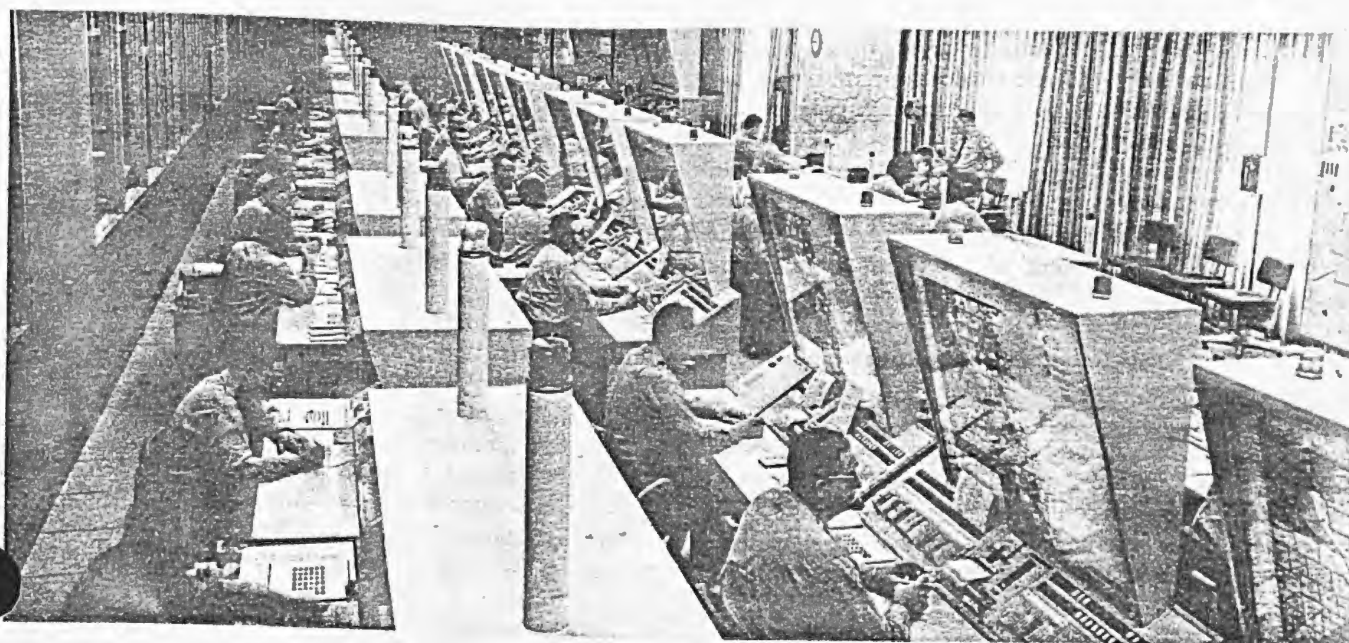
Once a call reaches the police, the facts must be sent to the police officers who will respond. This linkage occurs in the police communications center, which performs what the military calls the command-and-control function. Military analysts have given extensive attention to this function.

The communications center's role has increased as the telephone has become the common access to the police, and as more police officers have been equipped with radios. Even though the communications center is the nerve center controlling the minute-by-minute deployment of the police force, it has received surprisingly little attention. It is often squeezed into a spare corner of police headquarters under the command of a sergeant or a patrolman. It operates with obsolete or poorly designed equipment and procedures that have tended to evolve by chance rather than through careful design. A notable exception is Chicago, which invested \$2 million in modernizing its center in 1961.

When a person calls the police, a complaint clerk takes the call, decides on the police reaction and its priority, passes the information to a radio dispatcher who then dispatches a car. This gathering, evaluating, and disseminating of information normally takes from 1 to 5 minutes, and occupies 20-50 percent of the total response time. It can take much longer during periods of intense congestion.

*Immediate Improvements.* Even before considering major new technology, improving such simple aspects of command and control as floor layouts, design of headsets and microphones, and location of control switches

*Chicago Police Department's communications center*



and time stamps can improve a center's performance under heavy load. In some centers, the same person serves as the complaint clerk and the dispatcher; in others, the functions are separated. Some centers have a dispatcher handling part of a city; others have several dispatchers all handling calls for the whole city. Such differences, which can affect performance significantly under critical loads, have evidently evolved more from tradition and physical restrictions than as the result of planning. Each of the different possible configurations can be experimentally measured, both in operating centers and under laboratory control in a simulation laboratory. In this manner, standard and emergency plans and procedures can be tested, decision rules can be evaluated, and training and experience can be provided police officers under simulated extreme conditions.

In a riot or other general emergency, the communications center must transform a police department from a loose collection of independent units to a cohesive, coordinated force. Means must be provided to collect and display, rapidly and continuously, all the varieties of tactical intelligence relating to the location of events and the disposition of forces. The communications center staff must be headed by a commander who can assimilate this information and who has the authority to command the available forces. Contingency plans for situations that might arise must be developed and stored in a readily accessible form. These plans can be tested in a simulation laboratory.

#### *The Commission recommends:*

A versatile laboratory for continuing simulation of communications center operations, looking primarily toward changes in operating procedures and arrangements, should be established with Federal support.

*Computer-Assisted Command and Control.* In addition to operating changes, introduction of modern

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**EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF TELECOMMUNICATIONS POLICY  
WASHINGTON, D.C. 20504**

BULLETIN NO. 73-1

March 21, 1973

**TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS**

**SUBJECT: National Policy for Emergency Telephone Number "911"**

1. **PURPOSE.** This Bulletin sets forth the policies that will be followed by executive departments and agencies with respect to the development and improving of emergency communications using the emergency telephone number 911. It provides information and guidance to assist state, local and municipal governments in implementing this emergency communications program expeditiously.
2. **BACKGROUND.** A clear need that all citizens be able rapidly to summon help in an emergency situation has long been recognized. A communications system which is immediately available and easy to use can help to meet this need. A person should be able to call for police, fire, rescue, and other emergency aid promptly and without confusion, and without regard to his familiarity with a particular community. A system which is uniform nationwide will enable a citizen to do this.

For several years, numerous governmental commissions, legislative bodies, private organizations, and citizen groups have recommended the establishment of a single, nationwide emergency telephone number to meet this need for improved emergency communications. The 911 concept provides a single number which is easy to remember and to use. Moreover, the 911 system encourages those providing communications services and those providing emergency assistance to coordinate their efforts and facilities, and work together. The United States Independent Telephone Association and the Bell System have supported this concept, and have taken steps to implement it. Since 1968, over 200 communities with a combined population of 20 million have adopted and demonstrated the value of the 911 emergency telephone number concept.

The lack of a clear focal point in the Federal Government, and the absence of an overall national policy in this area, however, has slowed implementation of the 911 concept in many other communities. This Bulletin is issued to clarify the Executive Branch's position supporting the 911 concept as the means to achieve a single nationwide emergency telephone number.

3. **POLICIES AND PLANNING.** These are important points which should be borne in mind by all cognizant agencies with respect to the implementation of 911 service nationwide:

- (a) It is the policy of the Federal Government to encourage local authorities to adopt and establish 911 emergency telephone service in all metropolitan areas, and throughout the United States. Whenever practicable, efforts should be initiated in both urban and rural areas at the same time.

The primary purpose of 911 emergency telephone service should be to enable citizens to obtain law enforcement, medical, fire, rescue, and other emergency services as quickly and efficiently as possible by calling the same telephone number anywhere in the Nation. A secondary objective should be to enable public safety agencies to satisfy their operational and communications needs more efficiently.

- (b) Responsibility for the establishment of 911 service should reside with local government. This is the level of government closest and most responsive to the beneficiaries of this service, and at which the need for most emergency service arises. At the local level the coordination of the responsibilities and functions of public safety agencies can best be accomplished, and consideration of special local needs undertaken most effectively. Since the areas served by telephone company central offices generally are not coincident with local political and jurisdictional boundaries, planning and implementation of 911 service should proceed through the cooperative efforts of all affected local agencies and jurisdictions.

The character of 911 service is essentially local and intrastate; Federal regulation or legislation in this area, accordingly, is not appropriate. States are encouraged to assist localities in their planning and implementing of 911 service.

- (c) The cost for basic 911 telephone service arrangements should not be a deterrent to its establishment. The direct cost to local governments generally includes only the charge for local lines and terminal equipment needed to answer and refer 911 calls.

Planning and implementation of basic 911 service should not be deferred pending evaluation of proposed additions to basic 911 service. A number of 911 service enhancements (automatic call routing to particular jurisdictions and agencies, automatic number identification, etc.) have been proposed. These service enhancements should be considered with regard to their cost-effectiveness. Local authorities should, however, proceed to implement basic 911 service, to which enhancements can subsequently be made if desirable.

- 4. **FEDERAL INFORMATION RESPONSIBILITY.** A Federal Information Center on the emergency telephone number 911 will be established within the Office of Telecommunications in the Department of Commerce, Washington, D.C. 20230. The information to be available includes material on the techniques and methods of service and a comprehensive handbook on 911. Advice and assistance will be available through this center to local governments wishing to initiate 911 service in their communities. The center will also act as a clearinghouse for information concerning Federal assistance programs that may be available for the establishment of basic 911 service.

The availability of this Information Center on 911 service should be considered by Federal departments and agencies which have responsibilities in this or affected fields.

CLAY T. WHITEHEAD  
Director



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# Ninety-third Congress of the United States of America

## AT THE FIRST SESSION

*Begun and held at the City of Washington on Wednesday, the third day of January,  
one thousand nine hundred and seventy-three*

### An Act

To amend the Public Health Service Act to provide assistance and encouragement for the development of comprehensive area emergency medical services systems.

*Be it enacted by the Senate and House of Representatives of the  
United States of America in Congress assembled,*

#### SHORT TITLE

SECTION 1. This Act may be cited as the "Emergency Medical Services Systems Act of 1973".

#### EMERGENCY MEDICAL SERVICES SYSTEMS

SEC. 2. (a) The Public Health Service Act is amended by adding at the end thereof the following new title:

#### "TITLE XII—EMERGENCY MEDICAL SERVICES SYSTEMS

##### "DEFINITIONS

"SEC. 1201. For purposes of this title:

"(1) The term 'emergency medical services system' means a system which provides for the arrangement of personnel, facilities, and equipment for the effective and coordinated delivery in an appropriate geographical area of health care services under emergency conditions (occurring either as a result of the patient's condition or of natural disasters or similar situations) and which is administered by a public or nonprofit private entity which has the authority and the resources to provide effective administration of the system.

"(2) The term 'State' includes the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands.

"(3) The term 'modernization' means the alteration, major repair (to the extent permitted by regulations), remodeling, and renovation of existing buildings (including initial equipment thereof), and replacement of obsolete, built-in (as determined in accordance with regulations) equipment of existing buildings.

"(4) The term 'section 314(a) State health planning agency' means the agency of a State which administers or supervises the administration of a State's health planning functions under a State plan approved under section 314(a).

"(5) The term 'section 314(b) areawide health planning agency' means a public or nonprofit private agency or organization which has developed a comprehensive regional, metropolitan, or other local area plan or plans referred to in section 314(b), and the term 'section 314(b) plan' means a comprehensive regional, metropolitan, or other local area plan or plans referred to in section 314(b).

"(F) the application is submitted in such form and such manner and contains such information (including specification of applicable provisions of law or regulations which restrict the full utilization of the training and skills of health professions and allied and other health personnel in the provision of health care services in such a system) as the Secretary shall prescribe in regulations.

"(4) (A) An application for a grant or contract under section 1203 or 1204 may not be approved by the Secretary unless (i) the application meets the requirements of subparagraphs (B) through (F) of paragraph (3), and (ii) except as provided in subparagraph (B) (ii), the applicant (I) demonstrates to the satisfaction of the Secretary that the emergency medical services system for which the application is submitted will, within the period specified in subparagraph (B) (i), meet each of the emergency medical services system requirements specified in subparagraph (C), and (II) provides in the application a plan satisfactory to the Secretary for the system to meet each such requirement within such period.

"(B) (i) The period within which an emergency medical services system must meet each of the requirements specified in subparagraph (A) is the period of the grant or contract for which application is made; except that if the applicant demonstrates to the satisfaction of the Secretary the inability of the applicant's emergency medical services system to meet one or more of such requirements within such period, the period (or periods) within which the system must meet such requirement (or requirements) is such period (or periods) as the Secretary may require.

"(ii) If an applicant submits an application for a grant or contract under section 1203 or 1204 and demonstrates to the satisfaction of the Secretary the inability of the system for which the application is submitted to meet one or more of the requirements specified in subparagraph (C) within any specific period of time, the demonstration and plan prerequisites prescribed by clause (ii) of subparagraph (A) shall not apply with respect to such requirement (or requirements) and the applicant shall provide in his application a plan, satisfactory to the Secretary, for achieving appropriate alternatives to such requirement (or requirements).

"(C) An emergency medical services system shall—

"(i) include an adequate number of health professions, allied health professions, and other health personnel with appropriate training and experience;

"(ii) provide for its personnel appropriate training (including clinical training) and continuing education programs which (I) are coordinated with other programs in the system's service area which provide similar training and education, and (II) emphasize recruitment and necessary training of veterans of the Armed Forces with military training and experience in health care fields and of appropriate public safety personnel in such area;

"(iii) join the personnel, facilities, and equipment of the system by a central communications system so that requests for emergency health care services will be handled by a communications facility which (I) utilizes emergency medical telephonic screening, (II) utilizes or, within such period as the Secretary prescribes will utilize, the universal emergency telephone number 911, and (III) will have direct communication connections and interconnections with the personnel, facilities, and equipment of the system and with other appropriate emergency medical services systems;

April 12, 1974

HEW/EMS

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EMS: Comments are due into the Department of Health, Education & Welfare April 15 on proposed regulations to govern grants for feasibility studies and planning in connection with HEW's administration of the Emergency Medical Services Systems Act of 1973, and for establishment and operation, expansion and improvement of EMS systems.

The proposed regulations define an EMS system as "a system which provides for the arrangement of personnel, facilities, and equipment for the effective and coordinated delivery of health care services in an appropriate geographical area under emergency conditions (occurring either as a result of the patient's condition or of natural disasters or similar situations) and which is administered by a public or nonprofit private entity which has the authority and the resources to provide effective administration of the system."

The "appropriate geographical area" is defined as "an area in which the Secretary (of HEW) determines, on the basis of information contained in an application for a grant under this part and such other information as he deems appropriate for purposes of such determination, efficient and economically feasible emergency medical services can be delivered, taking into consideration existing medical service areas and comprehensive health planning areas, including areas with respect to which applications have been approved by the Secretary under Section 314(b) of the Act."

Among other things, the proposals state, an EMS system "shall (3) Join the personnel, facilities, and equipment of the system by a central communications system so that requests for emergency health care services will be handled by a communications facility which utilizes emergency medical telephonic screening; utilizes (or, with- in such period as the Secretary may prescribe, will utilize) the universal emergency telephone number 911; and will have direct communication connections and interconnections with the personnel, facilities, and equipment of the system and with other appropriate emergency medical services systems."

"A central communications system," HEW proposed, "includes a system command and control center which is responsible for establishing those communication channels and providing those public resources essential to the most effective and efficient emergency medical services management of the immediate problem, and which has the necessary equipment and facilities to permit immediate interchange of information essential for the system's resource management and control. The essentials of such a communications center are that (A) all requests for system response are directed to the center; (B) all system resource response is directed from the center; and (C) all system liaison with other public safety and emergency response systems is coordinated from the center. Except to the extent provided (elsewhere), the center need not direct or control medical care or treatment."

"Emergency medical telephonic screening," HEW said, "means that the communications system has the capability of redirecting requests for assistance that appear to be non-emergent in nature."

April 12, 1974

EMS

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It said "other appropriate emergency medical services systems" are "those in neighboring areas which might be involved in common disasters, those which are contiguous with the system, and those which have entered into agreements with the system."

Eligible applicants for the HEW grants are: "a state; a unit of general local government; a public entity administering a compact or other regional arrangement or consortium; or any other public entity and any nonprofit private entity." In the case of the latter, the applicant must show "that there is adequate community support for carrying out the project, including support from representatives of concerned public agencies and of private groups or other organizations in the service area of the project."

A section of the proposed regulations provides that the EMS project funds may be used for, among other things, "Purchasing communications equipment: provided that there exists an overall public safety communications plan for the service area of the project that is consistent with the regulations of the FCC. . . ; existing equipment and facilities are utilized to the fullest possible extent; and evidence is presented that reasonable effort has been made to obtain funds from other sources for such purpose."

As for 911 projects, HEW proposed the funds may be used for "establishing use of the universal emergency telephone number 911, except for costs customarily borne by the telephone company or local government."

The three-year, \$185,000,000 program provides for funding of 50% of the cost of a project, "or in the case of applications which demonstrate an exceptional need for financial assistance, 75% . . ."

BUSINESS-FOREST PRODUCTS: The FCC this week turned down a petition from Forest Industries Telecommunications which had asked amendment of rule Section 91.354 to give the forest products radio service shared access to 12 low power frequencies currently available to the business radio service. FIT, the Commission said, had stated that while technological advances in equipment manufacture and design have made remote control log hauling practical, the shortage of low power forest products frequencies has resulted in severe crowding and limitation of the number of people who can take advantage of this method of operation. It said reallocation of the business frequencies was necessary to "ensure proper tone selection coordination," the FCC noted.

In response, however, the Commission said FIT's needs can be satisfied without reallocation, since forest products eligibles are also business radio eligibles, and can use the latter service for their remote control log hauling requirements. The agency said it discussed the matter of tone signal coordination with the National Association of Business & Educational Radio, and NABER "indicated that it would perform the necessary tone coordination in conjunction with the frequency selection coordination."

RESTRICTED RADIATION: The FCC this week proposed Part 15 rule amendments to update and clarify rules on technical specifications,

INDUSTRIAL COMMUNICATIONS, 647 National Press Bldg., Washington



## FCC sets up medical category for emergency radio service

*Emergency Radio*

Victor Block, Washington Editor

The Federal Communications Commission has adopted rules changes creating a "medical services" category in the special emergency radio service (SERS). The action finalizes proposed rules changes in a proceeding initiated last year (Docket 19880) and also covers two earlier commission proceedings.

In Docket 19880, the FCC invited comments on proposals by the Office of Telecommunications Policy recommending establishment of a new emergency medical radio service. The inquiry also sought views on recommendations concerning radio communications requirements for emergency medical services (TELEPHONY, Dec. 10, 1973, p. 12).

Previously, in August 1972, the commission had adopted a rulemaking notice (Docket 19576) to provide eligibility for comprehensive health services in the SERS. The FCC also released a rulemaking notice in November 1972 (Docket 19643) to allocate the 157.450 MHz frequency to the SERS for medical paging systems in hospitals.

The new rules adopted by the commission incorporate present hospital, physician and ambulance categories, and expand eligibility to public health organizations, nursing homes and other institutions and organizations that regularly provide medical services. The FCC said the expanded eligibility and permissible communications provisions will enable joint participation by all persons involved in medical communications.

The commission also said authorization of major allocations in the 450-470 MHz band will provide a frequency complex sufficient with proper system planning to afford full capability and flexibility for emergency medical service operations.

In adopting UHF allocations, the FCC said it is emphasizing flexibility to meet differing requirements in various areas. The allocations include two frequency pairs at 460/465 MHz for dispatch and common

calling or mutual aid communications; three frequency pairs at 463/468 MHz available primarily for biomedical telemetry, and also for other medical requirements; five additional frequency pairs at 463/468 MHz available primarily for general medical use and secondarily for telemetry and other medically-related communications; and four frequencies at 458 MHz (shared for highway call box operations) for extended portable operations in telemetry systems.

The commission also retained the VHF frequencies now allocated for practically all present medical communications. While the 450-470 MHz band frequencies will be used by most new medical systems, the FCC said operations in the VHF region will remain intact. In an effort to improve communication difficulties of these systems, the new rules allocate three additional frequencies for one-way medical paging systems and two low-power frequencies at 150 MHz for extended portable operations.

The commission said frequencies for use in medical services are shared by all licensees in an area, and that the most efficient use of the new UHF frequencies is expected to result from user cooperation in developing common systems. These would use central dispatch and control centers for coordinated operations under area-wire communications plans.

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SUMMARY CHRONOLOGY -- TV CAPTIONING FOR THE DEAF

1. December 17, 1970: FCC Public Notice Advisory says relationship between deaf and TV is similar to that of radio to blind, offers suggestions to licensees for emergency bulletins, etc., suggests stations rotate presenting useful information to deaf. But, FCC rejects idea of issuing rules, says licensees are best judge of viewer needs.
2. December 2, 1971: OTP letter to FCC encourages FCC to continue its efforts, notes inquiries from public and White House to OTP on subject.
3. December 20, 1971: Report on National Conference on TV for Hearing Impaired.
4. December 22, 1971: OTP letter to ABC praises industry efforts.
5. February 3, 1972: OTP briefing memorandum to Michael Farrell, White House.
6. July 13, 1973: OTP letter to FCC discusses need for emergency TV bulletins and captioning EBS.

7. August 1, 1973: FCC response to OTP, notes 1970 Public Notice, will consider OTP request for rulemaking, dismisses EBS captioning, notes NBS petition for line 21.
8. April 19, 1974: OTP letter to FCC again urges action, encloses letters (Alexander Graham Bell Association) complaining about insufficiency of broadcast alerts.
9. May 22, 1974: FCC response to OTP, notes PBS and NBS tests on program captioning, proposes no further action.
10. February 20, 1975: Senator Percy comments on need for TV captioning for the deaf, says FCC's Public Notice is inadequate.

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# PUBLIC NOTICE

Federal Communications Commission □ 1919 M Street, NW. □ Washington, D.C. 20554



FCC 70-1328

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December 17, 1970 - B

## THE USE OF TELECASTS TO INFORM AND ALERT VIEWERS WITH IMPAIRED HEARING

The Commission's attention has been directed to the need of deaf persons, and those with impaired hearing, for information concerning emergency situations which may affect safety of life or property, as well as their desire to benefit from news, information and entertainment programs. <sup>1/</sup> Estimates of the number of citizens who have impaired hearing and therefore have need for the receipt of news and entertainment material through appropriate television programming range from 8.5 million to 20 million. Many of these persons, it appears, live alone and oftentimes do not receive important news information unless advised by neighbors or friends.

As AM and FM radio are ideally suited to bring news, informational material and entertainment to the blind, so the video segment of telecasts are ideally suited to alert, assist and entertain persons with impaired hearing. Therefore, the capability of television to present visual material should be used to its fullest extent, i.e., while oral announcements of news bulletins, sports scores, weather conditions, etc. are being made on a telecast that the same material be presented, when feasible, visually.

The material which persons with impaired hearing need and desire to receive via telecasts falls basically into two categories--first, rapid receipt of emergency information which concerns the safety of life or property, and second, the receipt of news, information and entertainment. In respect to the need of all citizens including the deaf and hard of hearing for information concerning emergency situations, we are convinced there can be little argument. We suggest to TV broadcasters that they make use of visual announcements along with oral announcements when presenting bulletins of an emergency nature, such as approaching tornadoes, windstorms, hazardous driving conditions, escaped convicts, industrial accidents, health hazards and other community dangers. These visual announcements would not only provide an alert to persons with impaired hearing, but would also emphasize the importance of the announcement to all viewers.

<sup>1/</sup> The petition raising this subject mentioned particularly emergency material. To the extent that the petition concerns the transmission of written information relating to an Emergency Action Notification during conditions of a grave national crisis or war, or the use of EBS facilities, interconnecting systems and procedures including the use of the Attention Signal for day-to-day emergencies posing a threat to the safety of life and property, this matter is under active consideration by the National Industry Advisory Committee and action in this area will be considered at the conclusion of their studies.

The second category of telecasts (news, information and entertainment) with which the deaf and hard of hearing are concerned, also is significant and worthy, in our view, of broadcasters' attention. Leaders of the deaf and hard of hearing have made the following suggestions: In respect to news programs--that visual bulletins of the matter under discussion be presented, that weather maps have descriptive phrases placed on them and that some segment of the screen be, as far as possible, continually reserved for the presentation of the face of the announcer so as to permit lip-reading. In respect to informational programs--that such programs be presented concerning the problems of the deaf and hard of hearing. At this time we note that various educational television stations have been and are presenting courses in lip-reading. In respect to entertainment--that during sports programs the scoreboard be frequently flashed on the screen, that names of players or persons being pictured be presented in written form and that broadcasts of movies be made with subtitles when films are available with subtitles. We understand that some sub-captioned Hollywood films are available from the Division of Media Services and Captioned Films of the U.S. Office of Education.

We wish to emphasize that it is the responsibility of each licensee to determine how it can most effectively meet the needs of its viewers. We have not adopted and do not propose definite rules on this subject, and this Public Notice is advisory in nature. The above are suggestions of program presentation techniques which could assist a segment of our population, suffering from a significant handicap, and make the tremendously powerful television medium more useful to them. We believe that these techniques can be applied, to a significant degree, without interfering with the station's service to its general audience, and urge broadcasters to explore them and apply them to the extent feasible.

One approach to this subject which we believe warrants exploration is the possibility of stations presenting material in a form especially useful to the deaf on a rotating basis. If this were done, for example, by each of the various stations in a large city for a month, it might be possible for them to do more in the way of visual presentation of value to the deaf than each station would be able to do (or justified in doing) continuously. We suggest that licensees in multi-station markets explore this possibility. The Commission does not believe that discussions and joint efforts among licensees concerning programming for the deaf, without extending into other areas of programming or commercial practices, would be subject to question under the antitrust laws.

We hope that this Public Notice will alert licensees to the importance of making television a truly valuable medium for the hard of hearing, and of our concern about the matter. We will observe developments in this area in the near future, and if the situation does not develop satisfactorily it may be necessary to begin rule making looking toward the adoption of minimum requirements.

Action by the Commission December 16, 1970. Commissioners Burch (Chairman), Robert E. Lee, and H. Rex Lee, with Commissioner Bartley dissenting, and Commissioner Wells concurring in the result.

Distribution: To all television licensees.

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EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF TELECOMMUNICATIONS POLICY  
WASHINGTON, D.C. 20504

DEC 2 1971

DIRECTOR

Honorable Dean Burch  
Chairman  
Federal Communications Commission  
Washington, D.C. 20554

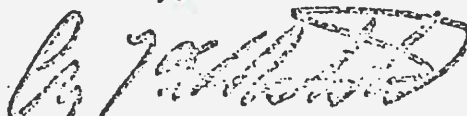
Dear Mr. Chairman:

Correspondence received in my Office over the past year has impressed on me the potential of communications and electronics techniques for improving the lives of millions of hearing impaired citizens in the United States.

Not long ago, Dr. Edward E. David, Jr., the President's Science Adviser, informed me of his strong interest in petitions before the Commission looking toward the use of radio frequency devices as auditory training aids for persons with severely impaired hearing. While not endorsing any particular product, petition, or technique, we agreed to inform you that the Administration strongly supports activities to accommodate and foster new technologies, devices, and aids for the handicapped. Particularly noteworthy also are actions which foster the interest of the broadcast industry, such as was done by the Commission's Public Notice (FCC 70-1328), in offering telecasts that provide a means whereby warnings and emergency bulletins and other services could be made available to viewers with impaired hearing.

I understand that the Commission has an open docket on the matter of electronic training aids for the hearing impaired which undoubtedly will provide additional benefits. We want to encourage the Commission and the industry to continue their fine efforts in this important field.

Sincerely,



Clay T. Whitehead

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EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF TELECOMMUNICATIONS POLICY  
WASHINGTON, D.C. 20504

Date: December 20, 1971

Subject: Report on National Conference on Television for the Hearing Impaired

To: RECORD

1. The National Conference on Television for the Hearing Impaired was held in Knoxville, Tenn., December 14, 15, and 16, 1971 at the Southern Regional Media Center for the Deaf on the campus of the University of Tennessee. The undersigned attended and participated in the December 14 meetings only where it was felt that the OTP input would be most effective.
2. The Conference was purposefully limited in the number of attendees--the objective was, in short, to get those who could speak for the interests of the hearing impaired in Television Broadcasting together with those who were in position to do something about the requirements. Following is a partial (but the most significant) list of the attendees:

Mr. Julius Barnathan - Vice President ABC for  
Broadcast Operations

Mr. Leonard Maskin - Vice President ABC for  
Administration

Mr. William Carlisle - Vice President NAB for  
Television

Mr. John Grogan - Time-Life Films

Mr. John Desmond - Universal Pictures

Mr. John Torbet - Executive Director, FCC

Mr. Joseph Weidenmayer - Alex. Graham Bell Assoc.  
for the Deaf

Mrs. Elizabeth Eastburn - American Assoc. of Retired  
Persons

Mrs. Mary Jane Rhodes - Council of Organizations  
Serving the Deaf

Dr. George Camas - National Bureau of Standards

Dr. Jerome Schein - N.Y.U. Deafness Research Center

Mr. Malcolm Norwood - Chief Media Services and  
Captioned Films Branch, HEW

3. The Conference opened with presentations by Mr. Norwood and Dr. Schein on the needs of the hearing impaired. While not much new was said, Mr. Schein made a couple statements of interest, namely: (1) "Regrettably access to the radio frequency spectrum is governed by Nielson ratings", (2) "Size of the deaf audience should not be the measure for determining its participation in our society", and (3) "CATV is the real answer for the deaf. The practical fact is that no major TV station will devote an hour of time to 'deaf' events."

4. Unfortunately for Dr. Schein ~~was~~ that he spoke early in the Conference saying that CATV was the answer. Later the ABC representatives and the National Bureau of Standards put on a demonstration of the proposed NBS TV Time System. Because the NBS system was designed to use modern integrated circuitry, it is possible, using the NBS time code generator, to put captions on a regular TV program. Most important is that the captions would not be seen by the viewing audience unless they had a decoder and wanted to see the captions. Several captions would be available at the same time.

5. ABC and NBS cooperated in putting on a live demonstration of the latter's captioning system on a program originated in ~~its~~ ABC's New York studios. As a matter of fact the captioned portion of the cooperative program had its own "bullseye", i. e.:

A  
NBS  
C

There is no doubt that the NBS system is a real break through on two points, namely: (1) providing a new type of national time clock (i. e. a continuous visual clock) and (2) a practical technique for captioning TV programs primarily for the benefit of the hearing impaired. The presence and personal participation by two ABC Vice-Presidents in both the Conference and the cooperative demonstration is an indication of at least that network's interest.

6. The Conference received considerable press coverage--at least in the Knoxville area. It was featured on both the 6:00 P.M. and 11:00 P.M. television news programs with considerable footage devoted to the conferees in session.

7. As it was known that the undersigned could participate only in the first day of the Conference, the Convener invited remarks from

the OTP representative after the above described demonstration was completed. Attached is a copy of the remarks made--delivered extemporaneously--and judging from the later questions and comments was well received.

8. COMMENT: This Conference is the latest in a series of actions that was started in December 1968 by a Delegation of Representatives from Deaf Organizations calling on Mr. J.D.O'Connell, then Director of Telecommunications Management, to describe their problems. As a consequence, the DTM sent letters to the Presidents of NBC, CBS, and ABC to start an initiative going. Since then there has been considerable progress in the field of auditory training aids, teletypes for the deaf, and more TV programming adapted for the hearing impaired. The undersigned has worked continuously in a low key role on the part of OTP to assist with this progress. With positive results beginning to appear and support increasing, continued active interest by OTP is certain to bring on results that will be appreciated by many hearing impaired people and their families.

  
L. R. Raish

Mr. Perkins (..... introduced Mr. L. R. Raish from the staff of the Office of Telecommunications Policy, Executive Office of the President.)

Mr. Raish: Thank you, Mr. Perkins, for the fine introduction and the opportunity to be present here in Knoxville at the National Conference on Television for the Hearing Impaired. The work you are about to undertake is important as it can result in bringing the joys of television to a vast new audience. As you go about your work, I want you to know that there is interest and encouragement on the part of persons high in the Administration in seeing that technology, particularly telecommunications technology, is applied to aid the handicapped. Mr. C. T. Whitehead, the President's Director of Telecommunications Policy and Dr. Edward David, the President's Science Adviser have both indicated their strong interest in the subject---this interest has been stressed in two areas, namely, (1) the availability of auditory training aids for persons with severely impaired hearing and, (2) the greater uses of captions in television broadcasting (the principal subject of this conference).

The nature of both these areas is such, that in the "Washington structure," they come under the regulatory purview of the Federal Communications Commission. An auditory training aid is, when you get down to it, a small radio transmitter/receiver operation. It is the type of thing that requires radio frequency assignments, minimum technical characteristics, and finally FCC "type approval." Television captioning is related, of course, to broadcasting. Thus the role of our Office is one of providing encouragement to keep efforts in the

telecommunications area on behalf of the hearing impaired moving forward. Just on December 2, 1971, Mr. Whithead expressed officially to the Chairman of the Federal Communications Commission the views of the Administration which are to strongly support "activities to accommodate and foster new technologies, devices, and aids for the handicapped." Noted in this same expression were the two points that I just mentioned, i. e. auditory training aids and television captioning and it concludes with the statement that "we want to encourage the Commission and the industry to continue their fine efforts in this important field."

By my presence here on behalf of the Office, I want to extend this encouragement. You have assembled at this conference talented and skilled professional persons, largely from the private sector, who are both in position to provide superb advice and then to do something about the decisions you reach. I emphasize that you who have organized this conference are "going at the subject" in the right manner. You are out to accomplish something at the "grass roots" level where, in my opinion, the most responsive results can be achieved. At this meeting you have brought together those who represent the "needs" and those who can "do something" about those needs. Seeking a solution by working in the private sector, as I see it, will get you the best solution and for this reason, on behalf of the Office, I encourage you to go forward with the course of action you have started. This in my opinion, is much

more the preferred route rather than to attempt achieving your aims through legislative fiat or through Rulemaking by the FCC to force the industry to do something.

The practical fact is that broadcasters are businessmen who are out to best serve their customers. They have a fine record of being interested and responsible citizens--but they must know your needs in order to be responsive. We have seen a superb demonstration of industry responsiveness by one of the major networks here tonight. So my advice is to keep right on working with the broadcasting industry and then "pass the word" to the membership of Deaf organizations and associations to keep broadcast station owners apprised of their needs. When a station puts on a program that is well captioned or otherwise adapted so that the hearing impaired can enjoy it, let the owner know about it with a show of letters, postcards, and phone calls--i.e. a sort of hearing impaired "Nielsen rating." When a station owner or a network goes to this extra effort, those responsible for programming want to know about it. With assurance that such programs are in fact being watched, it is only good business and service satisfaction for him to continue.

Now in closing, I would like to pose a question as to how many hearing impaired persons are we talking about? During the discussions so far, we have heard various statistics--it is important from my standpoint and the Broadcast interests represented here are entitled

to know with a reasonable degree of certainty, the numbers of our U.S. population that are affected. Perhaps Mr. Weidenmayer of the Alexander Graham Bell Association could provide some information--- and Mrs. Eastburn of the American Association of Retired Persons could offer some comments on the number of cases of geriatric deafness.

Mr. Weidenmayer .....

Mrs. Easturn .....

EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF TELECOMMUNICATIONS POLICY

WASHINGTON, D.C. 20504

DIRECTOR

DEC 22 1971

Mr. Julius Barnathan  
Vice President, Broadcast Operations  
and Engineering  
American Broadcasting Company  
1330 Avenue of the Americas  
New York, New York 10019

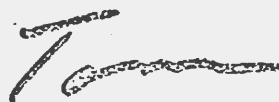
Dear Julie:

I have learned recently of the cooperative tests being conducted by the National Bureau of Standards and the American Broadcasting Company to prove the feasibility of TV captioning. While development of the "TV Time System" has been a principal motivation, I understand that the cooperative demonstration of ABC and NBS at last week's National Conference on Television for the Hearing Impaired also showed that the same technique could be a real "breakthrough" from the standpoint of deaf people and their families.

It is great to see this extra effort by the U.S. broadcasting community to bring television to our citizens with impaired hearing.

I enjoyed talking with you in New York, and hope we can get together sometime when we can trade views in a little more depth.

Sincerely,



Clay T. Whitehead

E

February 3, 1972

MEMORANDUM FOR

Mr. Michael Farrell

Subject: Petition of the Council of Organizations Serving the Deaf

I understand that the Council of Organizations Serving the Deaf has petitioned for captioning of television news programs and Presidential speeches. In this connection there have been fairly recent developments which I would like to make known to you.

The National Bureau of Standards (NBS) has pioneered a new technique in which written information may be embedded in unused portions of a normal television broadcast signal. This information can be displayed simultaneously with the television picture if the television set is equipped with a relatively inexpensive attachment. Initially, NBS became interested in this technique as a means of distributing very accurate time and frequency information for which they are responsible. Since the technique can be used for transmission of any written information, several uses other than time-frequency distribution have been advanced. The two which are of principal interest are TV captioning for the hearing impaired, and network control of programming.

NBS has been working with all three major networks, but ABC has shown a special interest and has participated in a number of live demonstrations. A demonstration is now scheduled for Gallaudet College on February 15. Attendance at this demonstration is being promoted by Secretary Stans of the Department of Commerce who has extended invitations to several high government officials.

The Federal Communications Commission (FCC) rules do not now allow use of this technique in commercial TV broadcasting. However, NBS, strongly supported by the three networks plan to petition the FCC for a change in rules.

Since the technique has commercial implications we believe that the impetus for the necessary rule changes by the FCC should come from the broadcasting industry rather than from the Administration. However, it is appropriate for the Administration to indirectly foster use of the system on a voluntary basis for the hearing impaired, and we have taken steps to do so.

For your information I am attaching some of our correspondence in this regard.

*George F. Mansur*  
George F. Mansur

Atchs.

cc: DO Chron  
DO Record  
Mr. Whitehead (2)  
Capt Raish ✓

GF Mansur/tw/2/3/72

F

OFFICE OF TELECOMMUNICATIONS POLICY  
EXECUTIVE OFFICE OF THE PRESIDENT  
WASHINGTON, D.C. 20504

July 13, 1973

DIRECTOR

Honorable Dean Burch  
Chairman  
Federal Communications Commission  
Washington, D. C. 20554

Dear Mr. Chairman:

The enclosed exchange of correspondence is forwarded to you for consideration as to the actions that can be taken by the Federal Communications Commission to encourage greater use of captioning in the broadcasting of emergency bulletins by the nation's television broadcast stations.

The frustrations of the hearing impaired at seeing words such as "emergency bulletin" on their TV screens and then missing the entire warning because it was broadcast audio only can easily be appreciated. Further, in my opinion, even non-handicapped viewers would benefit from the reinforcement of audio messages with some form of printed or handwritten message. The number of hearing impaired citizens in the United States is understood to run into the millions. Accordingly, it seems increasingly important that we find a means for assuring that emergency and other critical information ordinarily promulgated to the public by television stations be accomplished both in a visual as well as audio form.

Since television broadcasting stations are already providing a generally excellent public service in alerting their listeners to emergencies when they occur, it would seem that an extension or refinement of this established practice to include visual techniques is all that is required. Further, it seems to me that the subject is more a matter of adopting an operating procedure to accommodate the hearing impaired and, in my opinion, the public generally than it is a matter of establishing new policy.

I suggest too that consideration be given to planning for the use of captioning techniques in the Emergency Broadcast System (EBS) for the same reasons as stated above.

In urging the Commission to consider actions as regards the foregoing, the views expressed earlier in my letters of December 2, 1971 and June 28, 1972, on adopting the potentials of telecommunications technology to benefit our hearing impaired citizens, are reconfirmed.

Sincerely,

  
Clay T. Whitehead

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Attachment 2

FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D. C. 20554

8/1/73

IN REPLY REFER TO:

8600

Honorable Clay T. Whitehead  
Office of Telecommunications Policy  
Executive Office of the President  
Washington, D. C. 20504

Dear Mr. Whitehead:

This is in response to your letter of July 13, 1973, suggesting the desirability of Commission action to encourage the greater use of captioning in the broadcasting of emergency bulletins by television broadcasting stations, for the benefit of those of impaired hearing.

The Commission has recognized the potential value of television, if appropriately employed, for providing information and entertainment for the many millions without normal hearing, and in a Public Notice adopted on December 17, 1970, urged the licensees of television stations to adopt appropriate techniques to convey, by visual means, a significant portion of at least the more important information normally provided in their sound channels. A copy of this Public Notice is enclosed for your information.

The question raised by your letter is whether, having apparently failed to elicit a sufficient voluntary response to its Public Notice, the Commission should follow the procedure suggested in the penultimate paragraph of this Notice, and institute a rule making proceeding looking toward the adoption of minimum requirements in this area. Such "minimum requirements" might well include the mandatory captioning of all broadcast information of an emergency or critical nature, which, I agree, is a matter of first importance. We shall give full consideration to this approach.

Insofar as the employment of captioning techniques in the Emergency Broadcasting System (EBS) is concerned, I would remind you that, as an outgrowth of findings and recommendations made by your office, our EBS rules were extensively revised on April 5, 1972. Among other things, all references to the use of the EBS as a means for disseminating "warnings" to the general public were deleted. Thus, the EBS, as presently constituted, is essentially an inter-station signalling and program distribution system, which can be activated only in a manner and under the circumstances described in the rules.

Honorable Clay T. Whitehead

2

Of interest with respect to the general question of captioning, I would note the development of a technique whereby encoded captions are added to and transmitted with the television program, and appear on the screens of only those receivers equipped with appropriate decoding equipment. The National Bureau of Standards (NBS) has filed a petition with the Commission seeking the allocation of line 21 in the vertical blanking interval, to be employed in an NBS devised system for the dissemination of precise time and frequency information. This system has excess communications capacity, and it has been suggested that a portion of this excess capacity be employed in the provision of captioning for the hearing impaired, utilizing the above-described technique. Many institutions and organizations working with handicapped individuals have expressed a continuing interest in this system. In March of this year the Commission authorized the Public Broadcasting System, in behalf of its member stations, to test captioning techniques of this nature for a one year period.

The eventual adoption of rules authorizing the employment of such a system may promote the greater use of captioning by broadcast stations. However, its suitability for the dissemination of emergency information is questionable. It seems apparent that captions providing such information should be available to all persons of impaired hearing--not just to those whose receivers are especially equipped to display encoded captions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Dean Burch", with a long, sweeping horizontal line extending to the right.

Dean Burch  
Chairman

Enclosure

H

OFFICE OF TELECOMMUNICATIONS POLICY  
EXECUTIVE OFFICE OF THE PRESIDENT  
WASHINGTON, D.C. 20504

April 19, 1974

DIRECTOR

Honorable Richard E. Wiley  
Chairman  
Federal Communications Commission  
Washington, D. C. 20554

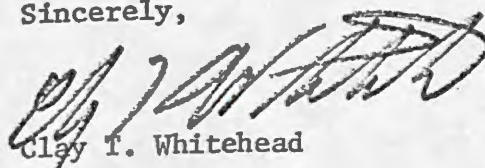
Dear Mr. Chairman:

The enclosed letter from the Alexander Graham Bell Association for the Deaf, Inc., is a reminder of the importance of and the need for more captioning of notices via television of tornado alerts and other emergency bulletins for the benefit of the nation's hearing impaired and deaf persons.

The Commission's Public Notice (FCC 70-1328) of December 17, 1970 addresses the subject of the use of telecasts to inform and alert viewers with impaired hearing. However, reports such as the enclosed continue to be received indicating that, while television broadcasters are improving services for the hearing impaired, there are still instances of alerts and warnings being transmitted by audio means only.

The enclosed letter is forwarded for consideration by the Commission as to appropriate actions that can be taken to be more responsive to the needs of the nation's hearing impaired and deaf citizens in times of danger.

Sincerely,



Clay T. Whitehead

Enclosure



FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

5/22/74

Attachment 3  
LRR  
5/13/74

IN REPLY REFER TO:

8820

Mr. Clay T. Whitehead  
Office of Telecommunications Policy  
Executive Office of the President  
Washington, D.C. 20504

Dear Mr. Whitehead:

This refers to your letter of April 19, 1974, concerning the use of television to alert and inform deaf and hearing impaired persons.

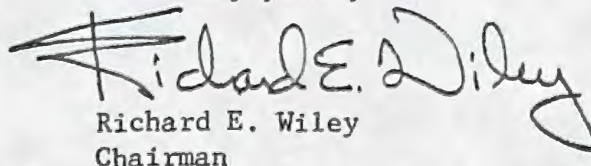
In the general area of programming for the deaf and hearing impaired, the Public Broadcasting Service (PBS) is proceeding with tests of two systems of program captioning, pursuant to special experimental authority granted by the Commission. The systems, developed by the National Bureau of Standards and Hazeltine Research, Inc., utilize an encoded signal, which can be received only with specially designed decoding equipment. After some delays, PBS has informed the Commission that it now has 20 decoders available for field tests of each system, and looks forward to the successful conclusion of its testing program late this summer. At that time PBS has indicated it will file with the Commission a petition for rule making to provide for captioning on a regular basis.

In regard to the problem specifically raised by your letter, the captioning of notices of weather alerts and emergency bulletins, it is not clear whether the techniques which are the subject of the PBS experiments are viable or suitable methods of presenting this information. Presumably, this is a possibility which could be explored at the time the Commission considers the anticipated PBS petition.

In his August 1, 1973, letter to you concerning this same subject, former Chairman Burch stated that "captioning of all broadcast information of an emergency or critical nature...is a matter of first importance." Let me assure you that this continues to be the position of the Commission, and that this matter will receive our full consideration.

Thank you for again calling the problem to our attention.

Sincerely yours,

  
Richard E. Wiley  
Chairman

J

OFFICE OF TELECOMMUNICATIONS POLICY  
EXECUTIVE OFFICE OF THE PRESIDENT

WASHINGTON, D.C. 20504

September 11, 1974

To: John Eger

From: Will Dean

Subject: Captioned TV for the Hearing Impaired

This is in reply to your request at Monday's staff meeting for background information on the above subject.

Starting in 1970-71 time frame OTP lent its support to adoption of techniques, primarily captioned TV, that would permit greater use of telecommunications to benefit our hearing impaired citizens (figures run as high as 20 million). The principal objective was (and still is) to make TV serve the hearing impaired as radio broadcasting serves the blind.

The problems of the hearing impaired fall into two general categories, i.e., (1) emergency bulletins and (2) providing TV viewing and entertainment in general. Emergency bulletins, such as flood and tornado warnings, broadcast orally do not help the hearing impaired. Members of the hearing impaired community, with support from OTP, have pleaded to the FCC for better service. So far the FCC stands on its Public Notice published on December 17, 1970, which merely alerts licensees "to the importance of making television a truly valuable medium for the hard of hearing ..."

During 1971 the National Bureau of Standards (NBS) developed a captioned TV Time System. Because this was designed to use modern integrated circuitry, it is possible, using the NBS code generator, to put captions on a regular TV program. The captions would not be seen by the viewing audience unless they had a decoder (a small and inexpensive device) and wanted to see the captions. While NBS interest was to provide captioned TV time service, the same decoder could provide captioning for regular programs. This development excited the hearing impaired interests. During late 1971 and 1972 NBS, in cooperation with the ABC network, conducted several demonstrations. Early in 1973 the NBS petitioned the FCC to adopt a Notice of Proposed Rulemaking that would lead to the authorization of commercial TV stations to broadcast NBS TV Time Signals. Possible advantages to the hearing impaired were pointed out.

The aforementioned petition, as we understand, is still pending in the Broadcast Bureau. In the meantime, informal advice is that the NBS has slowed down on its interest in pushing captioned TV.

Attached for your background information are copies of the following from our files:

- A February 3, 1972 Briefing Memo to Michael Farrell in the White House.
- A 1973 exchange of correspondence between Tom Whitehead and Chairman Dean Burch.
- A 1974 exchange of correspondence between Tom Whitehead and Chairman Wiley.

Attachments

*Will*

K

continually increased, and are now afraid to stand still. We should think about it while there is still time. Our tax laws have been written so that continual expansion is the only way a business can retain any earnings. I hope that someday responsible people will stand up and tell the people that there may be some dark days ahead.

We have built the greatest country on earth, but it would be tragic if we are consumed by our own excesses as past empires have been. Someday man must start learning from history instead of merely studying it.

This is not intended as a personal indictment, but is mostly a compilation of comments I have heard with some of my own ideas.

## LITHUANIAN INDEPENDENCE

Mr. BAYH. Mr. President, February 16 marked the 57th anniversary of Lithuanian independence. It is most appropriate that we take a moment now to review the struggles of a gallant people, whose quest for independence, human dignity, and the basic right of self-determination goes on today, in the face of tremendous odds.

As possessors of uniquely rich literary, linguistic, and cultural traditions, the Lithuanian people have had a great and meaningful history. Lithuania dates from the 11th century, and was once an expansive and powerful state in the Baltic region. Invasions by Germans, Mongols, and Tatars, attempting to gain strategic advantage, were frequent. Yet the Lithuanian people repelled all attempts at subjugation, until Tsarist Russia finally gained control of the territory in the 19th century. Still, these noble people would not bend to Tsarist pressures for cultural assimilation, and managed through never-ending struggle to preserve their religion, language, and culture. Finally freed from economic and political repression at the close of the First World War, Lithuanian independence was again triumphantly proclaimed on February 16, 1918. When, on July 19, 1920, the Soviet Government announced it "voluntarily and forever renounces all sovereign rights possessed by Russia over the Lithuanian people and their territory," it seemed that overweening Russian ambition for control of Lithuania was finally thwarted. Time, however, would prove these words insufficient to meet the challenge of the long-standing historical animosity between these two peoples.

During the period between the wars, Lithuania underwent a great cultural reawakening. But peace was to be short-lived, and the political maneuvers preparatory to the Second World War conspired to steal from the Lithuanians the independence that they had fought so hard to regain. Eight months after an initial Soviet demand for bases for her troops, a full-scale Soviet intervention robbed Lithuania of her sovereignty. Following a period of Nazi occupation, Lithuania was incorporated into the Soviet Union in 1944.

Today, it is easy to see in geopolitical terms the tragic result of the Soviet takeover of Lithuania—a free state has been reduced to a Baltic Republic of the Soviet Union. We have reports, as well,

which attest to the enormous cost in human terms of the Soviet policies. Acts of desperation by Lithuanian citizens, willing to make the ultimate sacrifice to rid their country of Soviet overlordship, are symbolic of the continuing demand of the Lithuanian people for the freedom they once knew. Free men around the world take heart in knowing that these people will continue to resist pressures to abandon their language and religion, despite ever-increasing hardships. Through their conviction to the principles of liberty and justice, the Lithuanian people will remain forever free, in spite of the outward bondage of their homeland.

Mr. President, the Lithuanian people are truly indomitable. They will never surrender to Soviet rule. They will never give up the fight to return freedom to their nation. They have endured, and will endure until they are once again able to express their feelings and views without fear of reprisal. Those of us in this great country must accept the responsibility to speak out against the blatant violation of the fundamental rights of the Lithuanian people by the Soviets, as we admire the example this nation has provided for us. We must never license by silence the dehumanizing and repressive policies of the Soviet Government. We must maintain our commitment to a free Lithuania.

## HELP IN EMERGENCIES FOR THE HEARING IMPAIRED

Mr. PERCY. Mr. President, 804 persons were killed and 12,000 persons were injured in 962 weather, fire, explosion, and transportation disasters that involved 5 families or more in the United States in fiscal 1974. Nearly 90,000 families suffered property losses in these disasters.

When disaster threatens or strikes a community, radio and television stations often broadcast emergency warnings to assist people in their efforts to protect themselves and their property. Emergency warnings broadcast by radio are of little or no value to the 13.4 million Americans who suffer from some degree of hearing loss. Warnings broadcast by television also are relatively worthless, because most television stations use only audio announcements. We must do more to urge television stations to broadcast visual as well as audio emergency warning announcements.

Of the 13.4 million Americans who suffer from some degree of hearing loss, nearly 2 million are totally deaf. The incidence of hearing loss has increased at such a rate that hearing impairment is now a more widespread affliction than heart disease, cancer, blindness, tuberculosis, and kidney disease combined. And over 70 percent of the hearing-impaired population do not use hearing aids, because of severe hearing loss, dissatisfaction with hearing aids, or low-income status.

Many broadcasters contend that hearing-impaired individuals do not watch television. But this contention has been refuted by a recent survey that showed that 71 percent of hearing-impaired per-

sons who responded said they usually watch television.

In 1970 the Federal Communications Commission issued a public notice suggesting the use of visual emergency messages by all television stations. But a recent survey of 700 commercial television stations revealed that only 38 percent of those that responded indicated that they provide either "captioned" or "interpreted" emergency bulletins. It is apparent, Mr. President, that the FCC's public notice, which does not have the weight of law, is inadequate.

On January 20, 1975, four organizations petitioned the FCC to initiate rule-making proceedings for the adoption of standards to require visual emergency warnings on television. Those organizations are Deafwatch—Demanding Equal Access to Facts and Warnings Aired on Television for Citizens Who Are Hearing-Impaired; the National Association for the Deaf; Deaf-Pride, Inc.; and the Alexander Graham Bell Association for the Deaf.

I endorse this petition and urge my colleagues to join me. Statistical tables indicate that each Member of the Senate has a sizable constituency that needs visual television emergency bulletins. Few States are free of disasters that necessitate such warnings.

Mr. President, I have written the FCC to urge adoption of the rule proposed in the petition and to urge extension of the 30-day comment period which ends February 24. I encourage my colleagues to do the same.

I ask unanimous consent that the tables I have mentioned, as well as the text of rulemaking petition RM 2502, be printed in the Record. Further information on the petition can be obtained from Deafwatch, 2000 H Street NW., Washington, D.C. 20006.

There being no objection, the material was ordered to be printed in the Record, as follows:

PREVALENCE AND PREVALENCE RATES FOR HEARING IMPAIRMENTS IN THE CIVILIAN NONINSTITUTIONALIZED POPULATION, BY DEGREE AND AGE AT ONSET: UNITED STATES 1971

Degree	Age at onset	Number	Rate per 100 000
All hearing impairment.....	(1)	13,362,842	6,603
Significant bilateral.....	(1)	6,548,842	3,236
Deafness.....	(1)	1,767,046	873
	(2)	410,522	203
	(3)	201,626	100

- <sup>1</sup> All ages.  
<sup>2</sup> Prevocational prior to 19 years of age.  
<sup>3</sup> Prelingual prior to 3 years of age.

DISTRIBUTION OF THE HEARING IMPAIRED POPULATION BY STATES: UNITED STATES, 1971

State	Hearing impaired	Deaf	Prevocationally deaf
Alabama.....	234,498	30,832	6,753
Alaska.....	20,480	2,664	553
Arizona.....	130,613	16,986	3,530
Arkansas.....	131,577	17,299	3,763
California.....	1,427,928	185,799	38,645
Colorado.....	160,902	20,076	4,349
Connecticut.....	179,486	20,321	4,709
Delaware.....	37,506	4,931	1,057
District of Columbia.....	49,350	6,489	1,421
Florida.....	472,263	62,093	13,600
Georgia.....	312,096	41,035	8,988

State	Hearing Impaired	Deaf	Prevocationally deaf	State	Hearing Impaired	Deaf	Prevocationally deaf	State	Hearing Impaired	Deaf	Prevocationally deaf
Hawaii	52,990	6,891	1,432	Missouri	303,982	44,688	11,196	Rhode Island	54,151	6,312	1,571
Idaho	52,274	6,798	1,413	Montana	53,706	6,566	1,364	South Carolina	173,440	22,834	4,995
Illinois	719,792	105,815	26,510	Nebraska	96,799	14,231	3,565	South Dakota	42,854	6,299	1,579
Indiana	340,011	49,885	12,522	Nevada	35,732	4,647	965	Tennessee	269,825	35,477	7,779
Iowa	184,017	27,052	6,778	New Hampshire	44,408	5,177	1,288	Texas	767,887	100,961	22,113
Kansas	143,395	21,080	5,281	New Jersey	423,821	49,401	12,299	Utah	78,626	10,225	2,126
Kentucky	220,203	28,952	6,342	New Mexico	72,753	9,462	1,966	Vermont	26,836	3,128	769
Louisiana	247,499	32,541	7,128	New York	1,074,764	125,275	31,190	Virginia	308,692	40,587	8,899
Maine	58,036	6,765	1,685	North Carolina	343,204	45,124	9,883	Washington	243,036	31,608	6,563
Maryland	267,783	35,208	7,712	North Dakota	39,507	5,808	1,455	West Virginia	119,121	15,662	3,433
Massachusetts	335,432	39,097	9,734	Ohio	694,198	102,053	25,567	Wisconsin	288,823	42,450	10,037
Michigan	579,614	85,208	21,347	Oklahoma	175,209	23,036	5,046	Wyoming	24,204	3,148	654
Minnesota	250,234	36,785	9,216	Oregon	154,815	20,174	4,184				
Mississippi	150,024	19,725	4,320	Pennsylvania	694,455	80,946	20,153				

THE AMERICAN NATIONAL RED CROSS, SELECTED DATA FOR DISASTER RELIEF OPERATIONS INVOLVING MORE THAN 5 FAMILIES, FISCAL YEAR 1973-74

State	Number of disaster operations		All disaster operations <sup>1</sup>			State	Number of disaster operations		All disaster operations <sup>2</sup>		
	Weather caused	All other <sup>1</sup>	Families suffering loss	Persons killed	Persons injured		Weather caused	All other <sup>1</sup>	Families suffering loss	Persons killed	Persons injured
Alabama	7	2	3,919	88	1,015	Nebraska	4	3	829		152
Alaska	1	1	96		32	Nevada	1		56		5
Arizona	1	2	154	2	188	New Hampshire		4	57		75
Arkansas	11	3	2,928	19	103	New Jersey	1	60	4,443	22	1
California	3	18	1,948	34	12	New Mexico	2	2	139		391
Colorado		2	111	4	8	New York	1	332	3,329	133	51
Connecticut	1	15	535	2		North Carolina	5	3	418		6
Delaware						North Dakota	1	2	806		5,432
District of Columbia						Ohio	13	11	11,428	47	490
Florida	6	9	518	10	142	Oklahoma	10	2	7,129	41	179
Georgia	7		838	22	210	Oregon	1	3	1,507	18	51
Hawaii	2		369	10	12	Pennsylvania	4	94	624	34	
Idaho	1	2	870	1	20	Rhode Island					41
Illinois	11	50	3,515	13	61	South Carolina	4	1	398	3	13
Indiana	8	2	5,637	47	935	South Dakota	5	2	413		673
Iowa	5	1	3,791	3	91	Tennessee	13	2	3,074	54	74
Kansas	6	2	2,207	13	294	Texas	13	8	1,840	22	
Kentucky	12	1	6,393	80	932	Utah					1
Louisiana	6	1	2,217	2	28	Vermont	1	1	81		18
Maine	2	7	109	4	8	Virginia	2	3	383	2	15
Maryland		20	216		15	Washington	2	10	1,639	5	44
Massachusetts	1	47	757	30	110	West Virginia	6	1	1,890	5	
Michigan	3	11	1,071	14	50	Wisconsin	1	4	440	2	45
Minnesota	2	2	382	4	33	Wyoming	1	1	232		1
Mississippi	12	3	5,091	3	37						
Missouri	6	6	1,726	4	1						
Montana	2	1	330								
						Total	207	755	87,890	804	12,141

<sup>1</sup> "All other" include: fires, explosions, transportation mishaps, et cetera.<sup>2</sup> State by State data for families suffering loss, persons killed and persons injured are consolidated for all types of disasters, i.e., "weather caused" and "all other."

## DEAFWATCH PETITION FOR RULEMAKING

## I. INTRODUCTION

During a particularly devastating week in 1970, California was struck by wide-ranging fires. Scores of people died. Hundreds of thousands of dollars' worth of property was destroyed. Local officials attempted to reach and evacuate the residents of the area through the use of loudspeakers and radio and television announcements. As a result of these efforts many potential casualties escaped with their lives even though they lost their homes.

Others never had a chance. Many hearing impaired persons residing in the area between San Francisco and Los Angeles perished in the blazing fires. Of course, they had been oblivious to the loudspeakers and radio announcements. And the television announcements were not visual and were therefore useless in notifying the large numbers of hearing impaired Californians of the impending disaster.

That such deaths occurred is a sobering commentary on the failure of some public officials and television broadcasters to recognize and confront the special problems of the hearing impaired. That televised visual messages could have quickly reached those persons with minimal effort by a few persons, and that no such effort was made, is a blot on the public service record of the television industry.

The hearing impaired themselves, decades ago, hailed television as a miraculous invention. Finally, they thought, those who had been denied access to the benefits of the telephone, radio, and talkies could have access to mass communication through television.

But television did not remain television very long. Television today is little more visual, and no more accessible, to this nation's 13.4 million hearing impaired than radio. Instead, it is characterized by a heavy dependence on dialogue and as a result is simply "radio with pictures."

While this visual deficiency is often disappointing to the hearing impaired community craving news and entertainment, it may prove disastrous for them in the eventuality of certain types of emergencies requiring the immediate and complete notification of all citizens, including the hearing impaired.

The California fire is only one blistering example of a daily occurrence in this country: emergencies threatening thousands of persons and striking the hearing impaired with little or no warning. While these thousands rely on television to warn them of impending danger, television has, for the most part, breached its precautionary duties to the hearing impaired.

The two following situations provide additional examples of how the inaction of television broadcasters can produce devastating results.

On March 31, 1973, the citizens of Atlanta, Georgia, were suddenly confronted with a tornado and severe weather alert. Television stations in the area presented no emergency warnings in visual form. Hearing impaired people in the area "... had no way of knowing the extent or severity of the warnings, or the exact location of the sighted tornadoes." That there was a "Severe Weather Warning," was the extent of their awareness, since this was all that was presented visually by television broadcasters. Most of the citizens of Atlanta were fully informed

about, and prepared for, the devastation that was to strike. All that the hearing impaired citizens of Atlanta really knew, however, was the presence of some unknown danger, and the terror and pains such ignorance can cause.

The insensitivity of some broadcasters was demonstrated by another, all too true, situation. Atlanta, Georgia, was threatened by a tornado, by torrential rains and flood warnings, plus massive man-hunt for an escaped and dangerous convict. Panicked viewers were cautioned by a weatherman on one television station to listen to their transistor radios in order to stay informed of fast-break developments on all these crisis fronts. They were told that no one had any excuse for not keeping informed on the facts. Did this weatherman or his station stop to consider the needs of the thousands of hearing impaired people in his audience? The answer is self-evident—as is the frustration and fear that the hearing impaired endure when confronted by an emergency in the absence of visual emergency bulletins.

Imagine the fright of a person who cannot hear, when confronted with a printed message on the television screen which reads only: Emergency Bulletin! The message remains on the screen for what seems to be an interminable period of time while an off-camera announcer reads the details to the hearing audience. No visual information follows for the hearing impaired person. He panics, frantically wondering what the emergency is and what he should do to save his life, his family, and his property.

Television broadcasters could end this needless panic by simply adding visual messages to their aural emergency notifications.

It is submitted that broadcasters who have abdicated by their inaction any entitlement to regulatory abstention, must be required by the Commission to act affirmatively to relieve this terrible situation.

The technology for visual emergency notifications has long been available. Now this technology must be implemented to serve the public and to preserve the emotional and psychological security of millions of hearing impaired viewers. In light of the potential for saving lives and the simplicity and low cost with which the petitioners' proposals can be implemented, there is no excuse for Federal Communications Commission (hereinafter, "Commission") inaction in this matter.

A 1970 Public Notice (FCC 70-1328) issued by the Commission, entitled "The Use of Telecasts to Inform and Alert Viewers with Impaired Hearing," suggested to television stations that when broadcasting emergency information which concerns the safety of life or property they might present such notices visually as well as aurally. The Commission noted that "there can be little argument about the need of all citizens including the deaf and hard of hearing, for information concerning emergency situations."

Yet, after four years, this need still has not been fulfilled and, consequently, the lives, property, and psychological security of the hearing impaired remain jeopardized. Those who are hearing impaired should have the same chances of survival in an emergency as those without this handicap, and only the Commission by its regulation of television broadcasters can even the odds.

The Commission warned in its Public Notice that if broadcasters failed to take appropriate steps in this direction it might be necessary to begin rule making procedures to adopt minimum requirements. Broadcasters have unfortunately failed to so act, and there is now no question about the appropriateness or timeliness of the Commission initiating rule making proceedings. The time is ripe to use the medium of television to the fullest extent both aurally and visually. To do this, the Commission must establish rules requiring all television stations to present visual emergency bulletins. The petitioners respectfully submit that the Commission must fulfill its promise of four years ago. It is the hope of the petitioners and deaf individuals and organizations across the country that the necessary rule making proceedings will be instituted in order to solve one of the major problems confronting the deaf and hearing impaired in today's world.

## II. THE LIVES AND PROPERTY OF MILLIONS OF HEARING IMPAIRED AMERICANS ARE BEING JEOPARDIZED

### A. Hearing Impairedness is the most common physical disability in the United States

The numbers of hearing impaired who may be threatened in natural or man-made disasters are astounding. One out of every fifteen persons in the United States suffers some degree of hearing loss. Of the at least 13.4 million Americans afflicted with a hearing loss, 1.8 million are suffering from total deafness.

The incidence of hearing loss in the general population is increasing yearly, due to two factors. First, improved medical care and scientific discoveries have allowed those with hearing impairments to survive other major disabilities and diseases and therefore live longer. Second, the gradual urbanization of our population, and the resulting exposure to greatly increased noise levels, inflicts many urban dwellings with hearing impairments.

Hearing impairedness is the most common, least recognized, physical disability in the United States. The incidence of impaired hearing is greater than that of heart disease,

cancer, blindness, tuberculosis and kidney disease combined. For example, the ratio of hearing impaired to blind Americans is thirty to one. Those Americans totally deaf outnumber blind persons by more than three to one. Yet, hearing impairedness is a disability which has been largely neglected by both public and private sectors of our society.

Not only is the affliction of hearing impairedness of wide-ranging and increasing frequency, but the affliction presents several unique problems and misconceptions which compound its seriousness. Contrary to popular belief, for example, the adverse consequences of hearing impairments outweigh those of visual impairments, since hearing, the main avenue of communication, is the foundation of learning. Helen Keller, afflicted by both deafness and blindness, made the following assessment of the relative burdens of both of these disabilities:

"The problems of deafness are more complex, if not more important, than those of blindness. Deafness is a much worse misfortune because of the loss of the most vital stimulus—the sound of the voice that brings language, sets thought afloat, and helps us in the intellectual company of man."

Like Helen Keller, many individuals suffer from other handicaps in addition to their hearing loss. The number of multiple handicapped has been placed at one out of three deaf persons, by the recent National Survey of the Deaf. These handicaps include asthma, arthritis, heart trouble and cerebral palsy. Because of their deafness and these other afflictions, many of the multiple handicapped are forced to be homebound. They become even more dependent on their limited sources of communication, relying on television as the prime means of receiving communication from the outside world.

Another common misconception is that most deafness may be corrected through the use of hearing aids. In fact, only limited types of deafness may be corrected in this manner. Over seventy per cent of the hearing impaired population is unable to use hearing aids as a result of severe hearing loss, dissatisfaction with hearing aids, or low income status. The result of this disability is an increasing dependence on visual stimuli, such as television.

Many of those who are hearing impaired are elderly citizens, and would certainly benefit from visual warnings. Their helplessness is aggravated by increased age, fear, inability to drive, run, or move quickly, along with the fact that many have additional handicaps. Thus the sooner they obtain emergency information, the better their chances of survival. They should not have to depend on others to inform them of an emergency.

It is obvious that even in normal times, the disabilities resulting from hearing impairments are burdensome, but in emergency situations these disabilities become especially onerous.

Emergencies pose a deadly threat to the hearing impaired because of their unique handicap. Compounding the seriousness of communicating warnings to the hearing impaired is the frequency and variety of emergencies.

### B. Widespread emergencies threaten the hearing impaired

Natural emergencies may result from earthquakes, tidal waves, hurricanes, tornadoes, ice storms, heavy snows, widespread fires, and a host of other disasters. Other emergency situations are man-made, arising from the discharge of toxic gases, air pollution, power failures, industrial explosions, and civil disorders.

No area of the country is immune from these disasters, which every day threaten the safety and life of thousands of individuals. In 1973, a natural disaster hit one out of every four counties in the United States.

The occurrence of flash floods, tornadoes, hurricanes, and earthquakes resulted in 46 presidential disaster declarations in 31 states. A major disaster struck some part of America almost once a week, resulting in hundreds of deaths and over a billion dollars in property damage. In 1972, the United States was ravaged by 48 major disasters. Two hundred people were killed by flash floods in South Dakota, while Hurricane Agnes left hundreds dead, and inflicted damage estimated at over three billion dollars. In 1974, there were a record number of disasters. On April 3, more than 300 people were killed and over a thousand hospitalized by tornadoes that caused over 500 million dollars worth of property damage to the southern and midwestern United States.

In 1973-1974, 963 disasters involving more than five families resulted in 330,471 persons being given mass care by the Red Cross. This figure does not include the 28,890 disasters affecting a relatively small number of families. In 1971-1972, 722,947 people were given mass care as a result of 633 disasters involving more than five families.

These figures are at once horrifying and compelling. That such a large number of disasters occurs annually is frightening. That they strike with no warning to the hearing impaired compounds the horror. Seconds of advance notice and preparation can often mean the difference between life and death. With adequate warning there are a number of safety precautions which a person may follow to avoid the danger, death and destruction that lurks behind every disaster. Such warnings are presently unavailable to the hearing impaired.

In light of the number of these disasters and the enormity of their effects, especially upon the hearing impaired, the need for governmental action is self-evident. The question remaining is how can the hearing impaired best be aided in preparing for such emergencies? How can they be informed so that they can escape the imminent danger?

## III. THE HEARING IMPAIRED CAN BE AIDED BY TELEVISION

### A. Only television can adequately warn viewers of impending danger

The medium of television is uniquely suited to warn citizens of impending emergencies. Its immediacy causes it to be more effective than the reading of a newspaper. Televisions' combination of both visual and aural means of communication allows it to reach a larger segment of the population than either radio or any other mass medium. Television, by its very name, implies the use of visual means of communication. It must live up not only to its name, but to its potential as well, when transmitting emergency information to the public.

The nation's 1.8 million viewers who are totally deaf cannot receive any information given orally—including emergency information. The 11.6 million people with lesser degrees of hearing loss often cannot understand such messages clearly. Indeed, even persons with normal hearing often misinterpret the spoken word on television. Thus visual emergency notifications will benefit not only the minority of hearing impaired, but also many of the normal hearing population.

Several members of the broadcasting industry have attempted to justify their failure to transmit visual warnings with the claim that such messages would not reach the hearing impaired since they do not watch television. This analysis has been proven unfounded on many occasions, most recently in a survey of deaf individuals. Seventy-one per cent of the respondents stated that they "usually watch television." Sixty-five per cent of the total said they watch "six or more hours on weekends."

With television's unique capabilities established, along with the fact that it has been

conclusively established that the hearing impaired do watch television, what is the response of the industry at large to the needs of the hearing impaired?

*Television broadcasters have failed to follow the suggestions of the Federal Communications Commission*

The responsiveness of the television industry to the needs of the hearing impaired must be considered in light of the past actions of the Commission. After the concerted effort of concerned individuals, the Federal Communications Commission took notice of the problems of the deaf and hearing impaired four years ago. On December 17, 1970, the Commission issued a Public Notice (FCC 70-1328) entitled "The Use of Telecasts to Inform and Alert Viewers with Impaired Hearing."

The Commission observed, "As AM and FM radio are ideally suited to bring news, informational material and entertainment to the blind, so the video segment of telecasts are ideally suited to alert, assist and entertain persons with impaired hearing. Therefore, the capability of television to present visual material should be used to its fullest extent, i.e., while oral announcements of news bulletins, sports scores, weather conditions, etc., are being made on a telecast that the same material be presented, when feasible, visually. . . . In respect to the need of all citizens including the deaf and hard of hearing for information concerning emergency situations, we are convinced there can be little argument. We suggest to TV broadcasters that they make use of visual announcements along with oral announcements when presenting bulletins of an emergency nature, such as approaching tornadoes, accidents, health hazards and other community dangers. These visual announcements would not only provide an alert to persons with impaired hearing, but would emphasize the importance of the announcement to all viewers." (Emphasis in original)

The notice was purely advisory, in that no formal legal requirements were imposed on broadcasters. Although the Commission made no threats of license non-renewal should broadcasters fail to comply with the Commission's suggestions, the Commission concluded:

"We hope that this Public Notice will alert licensees to the importance of making television a truly valuable medium for the hard of hearing, and of our concern about the matter. We will observe developments in the future, and if the situation does not develop satisfactorily it may be necessary to begin rule making looking toward the adoption of minimum requirements."

While the 1970 Public Notice was a progressive and commendable step forward, the lack of any force or sanction power behind it rendered it ineffective. The majority of television stations act as if no such Notice had ever been issued. The whim of each station determines its policy in visually broadcasting emergency messages.

Notwithstanding the Commission's statement with respect to the need for visual emergency notification on television for the benefit of the hearing impaired, only a small minority of stations have complied with the suggestion, and even their compliance has been largely marginal. A recent survey of 700 commercial television stations across the country attempted to ascertain the number of stations which have programming directed toward the hearing impaired. Only 269 or 38 per cent said they provided either "captioned" or "intertitred" emergency bulletins. Captioned bulletins present the written words on the television screen at the same time the oral announcement is being made, while interpreted bulletins feature a person or camera using sign language.

Yet, even this 38% figure is not a true indication of the number of stations presenting visual emergency notifications. Upon contacting one of the stations which responded affirmatively in the survey, petitioners were told that no such captioning practice was in existence at that station. If this discrepancy applies to other television stations as well, the true figure of the number of stations which caption might even be lower than 38 per cent. Even the most optimistic estimates demonstrate that the majority of stations are shirking their responsibilities to the hearing impaired population. Human lives are continually jeopardized by this inaction. Obviously, television broadcasters will not present visual messages voluntarily.

The burden for individual action should not be placed on deaf persons who are at such a great disadvantage with respect to communication skills. Several persons who have sought to have the Commission require that television stations present visual warnings have been told by the Commission "to consider dealing directly with television stations in their communities concerning their needs for emergency information. . . ." Because the hearing impaired often lack the self-organization necessary to bring about such action, and because they are not familiar with the broadcasting industry, they should not have to be the ones to attempt regulation or reconstruction of the television industry. Television stations should be required by the Commission, the most appropriate governmental regulator, to present this service to the hearing-impaired, with standardized regulations in the case of all emergencies. It is respectfully submitted that the Commission must fulfill its affirmative obligation to the hearing impaired community by requiring appropriate steps by broadcasters.

*C. Federal Communication Commission regulation of emergency notifications is necessary*

The prevalence of hearing impaired individuals, their peculiar nature of their disabilities, the frequency and severity of natural disasters and civil disorders, the potential effectiveness of television as a communication source, and the television industry's continued footdragging, all compel one conclusion: Television broadcasters must be required to utilize their unique medium in order to protect the lives and property of the hearing impaired by presenting visual emergency warnings.

The National Association of Broadcasters has claimed, "People depend on broadcasters. And because broadcasters have an excellent record of public service in times of emergency, people trust them." The hearing impaired should be able to rely on television in emergencies as do other people. For television to fulfill this trust, it is incumbent upon individual stations to provide their entire audience with reliable, visual information in times of emergencies. Since the sobering lesson of the past four years is that individual stations will not provide this emergency information on their own initiative, the Commission must promulgate regulations prescribing such visual notices.

#### IV. PROPOSED AMENDMENTS FOR THE REQUIREMENT OF VISUAL EMERGENCY NOTIFICATIONS

##### A. Emergency information transmission originating from broadcast stations

Petitioners propose an addition of a new subsection (b) to the Federal Communications Commission Rules and Regulations, 47 C.F.R. § 73.675. Section (a) and the proposed new section (b) would then read as follows (with subsequent sections being relettered):

(a) When necessary to the safety of life and property and in response to dangerous conditions of a general nature, television broadcast stations may, at the discretion of the licensee and without further Commis-

sion authority, transmit emergency weather warnings and other emergency information. Examples of emergency situations which may warrant either an immediate or delayed response by the licensee are: Tornadoes, hurricanes, floods, tidal waves, earthquakes, icing conditions, heavy snows, widespread fires, discharge of toxic gases, widespread power failures, industrial explosions, and civil disorders. Transmission of information concerning school closings and changes in schoolbus schedules resulting from any of these conditions, is appropriate. In addition, and if requested by responsible public officials, emergency point-to-point messages may be transmitted for the purpose of requesting or dispatching aid and assisting in rescue operations.

(b) Any emergency information transmitted in accordance with this section shall be transmitted both aurally and visually. The broadcast station may use any method which results in a message being easily readable on the receiver's television screen and conveying the same essential information contained in the aural bulletin. Illustrative, but not exhaustive of, methods which may be used are the following: teletypewriter, titling camera, captions, slides, scroll of paper with typed words, typewritten messages on index cards, previously prepared charts to be filled out with data at the time of notification, chalk on blackboard, white writing on black vinyl backing, or a felt marker on oak tag.

Broadcast stations shall at all times be prepared to utilize one suitable method and at least one back-up method. The methods and procedures to be used shall be predetermined, included in the operator's manual, and available for public inspection. They shall be posted prominently, both in the control room and in at least one newsroom, and all persons authorized to transmit emergency bulletins shall be informed of these procedures. An emergency drill of these procedures shall be held periodically to insure technical operability.

All emergency notifications shall include the following announcement, both aurally and visually: "If you have a hearing impaired or blind friend or neighbor, please pass this information on to him or her."

##### B. Transmissions pursuant to emergency broadcasting system procedures

The following changes are proposed as amendments to 47 C.F.R. § 73.933, Emergency Broadcast System (EBS) Operation During a National-Level Emergency:

1. 47 C.F.R. § 73.933(a)(4): After the word "announcement" insert the following: "in both aural and visual form."

Thus, 47 C.F.R. § 73.933(a)(4) will read as follows:

"Discontinue normal program and broadcast the following announcement in both aural and visual form: We interrupt this program. This is a National Emergency. Important Instructions will follow." (Italicized portion indicates proposed amendment).

2. 47 C.F.R. § 73.933(b)(8)(1): After "Standby Script" in line 2, insert the following: "and appropriate visual messages."

Thus, 47 C.F.R. § 73.933(b)(8)(1) will read as follows:

"Upon completion of the EAN message the Standby Script and appropriate visual messages shall be used only by Primary Stations (or stations required to assume that responsibility) until program material is available. The text of the Standby Script is contained in the EBS Checklists for Primary and Alternate Stations and for Primary Relay and Alternate Relay Stations."

3. Such further amendments to Title 47 of C.F.R. as may be appropriate and necessary to effect the policy of visual notification of emergencies.

### C. Additional actions requested of the Commission

It is further proposed that the Commission should initiate the following measures to allow the Emergency Broadcast System to conform to these proposed regulations:

1. Preparation of slides containing in printed form the announcement required by 47 C.F.R. § 73.933(b)(4). Reference should be made to these slides in the EBS Checklist, which contains simplified instructions for every station to follow in various situations. All stations should be required to use these slides.

2. Preparation of appropriate means for transmitting visually the same information contained in the "Standby Script" referred to in 47 C.F.R. § 73.933(b)(8)(1). The Standby Script consists of general information provided by the individual television station until emergency programming becomes available. The EBS Checklist should include reference to this visual information, and there should be a requirement of its use by all EBS stations.

3. Immediate initiation of a means of transmitting visually all information transmitted aurally through EBS.

In addition, the Commission should direct all state and local EBS authorities to initiate similar procedures for state and local emergencies.

### V. EXPLANATION OF PROPOSED AMENDMENTS

#### A. Emergency information transmission originating from broadcast stations

Most emergencies do not have a nationwide impact. Natural and man-made emergencies are usually local and, as previously mentioned, strike one out of every four counties in the United States each year. Thus, the responsibility for warning the public about emergencies lies primarily with individual local television stations, and the amendment to 47 C.F.R. § 73.675 is directed towards them.

#### B. Requirement of printed messages as proposed to other means of communication with the hearing impaired

The printed word has been chosen as the best method to be used in communicating to the hearing impaired because it reaches the largest number of people. A significantly smaller proportion of the hearing impaired population reads lips or understands the language of signs.

Although there are no precise statistics available on what percentage of the hearing impaired would prefer and benefit from printed messages, there are a few indicators. In a recent study by the New York University Deafness and Research Training Center, which attempted to ascertain the reactions of hearing impaired individuals to a certain captioned and signed television program, 84 percent said they "always understood captions" while only 34 percent "always understood signs." When the participants were asked whether they would like future programs to be captioned, signed, or both, a majority, 53 percent, requested both captioned and signed, while 44 percent preferred captioned, and only 3 percent asked for signed. While this survey may not accurately depict the desires of the entire hearing impaired population, it does indicate their preferences as to what means of communication television should utilize. The conclusion that may be logically drawn from these studies is that more of the hearing impaired population prefer and understand captions than signs.

One must also keep in mind the distinction between the hearing impaired and the deaf. The understanding of signs is generally limited to people who became deaf or severely hearing impaired early in life and have had special training in signing. The leaves a substantial number of people who are hearing impaired but not deaf or who became so late in life, have not learned sign language, and do not benefit from signs. The logical

means of reaching all, then, is the printed word.

Although the number of those who can understand lips and signs is limited, it may be assumed that the hearing impaired's reading ability approximates that of the rest of the population. Overall, the deaf population of the United States is only one year below the national educational level in highest grade obtained. Therefore, printed messages would be of benefit to a much higher percentage of the hearing impaired population than other methods of communication.

There are several other serious limitations precluding the use of lipreading and signs. Lipreading has limited value as a means of communication. Even for those individuals who primarily rely on lipreading, only 25 percent of spoken English can be ascertained from the lips; the other 75 percent must be guessed from the context of the conversation. A practical problem of signing is that it is highly unlikely that a station would be able to obtain a signer quickly in an emergency. In addition, signing is hard to understand when reduced to the size of a normal television screen. Because the language of signs is three dimensional, it is not well suited to the two dimensional television screen. Therefore, it is obvious that the printed word is the most effective and expedient means of reaching the hearing impaired in an emergency.

#### C. Explanation of various methods of presenting visual messages

Suggested methods which may be used to transmit a printed message are listed in the proposed rule. The purpose of the list is to suggest specific ways of meeting the required standards, while at the same time allowing for flexibility according to the needs and capabilities of individual stations. Some stations will be able to produce simple and effective messages quickly and easily with a teletypewriter. Others, who may not have even this relatively inexpensive equipment, will be able to easily meet the specifications with minimum effort by hand printing or typing a message on an index card and focusing a camera on the card. It does not matter which method is used in broadcasting the visual message, so long as the message is easily readable and understood by the viewer.

#### D. Suggestions for implementation

Individual stations are urged to use the most suitable method of transmitting the essential information in printed form in the shortest amount of time possible.

As an aid to broadcasters, the National Weather Service, through its Council on Community Preparedness, has offered to make low-cost slides available to broadcasters. These slides would not include sufficient information to cover specific emergency situations but would, instead, inform the public of the general nature of natural emergencies, e.g., tornado, hurricane, flood. It is suggested that broadcasters use these slides, or similar ones which they might produce, for initial notification, and then follow this up with a more specific printed message. This method would permit the public to be alerted immediately, giving the broadcaster time to transmit the specific details a short time later.

Another method of saving time when disaster strikes is to have on hand previously prepared charts which could be filled in with the essential details at the time of an emergency, for example:

Channel 10 WOWW  
Tornado Warning

Area \_\_\_\_\_

Duration \_\_\_\_\_

Specific Information \_\_\_\_\_

Stations might also choose to broadcast a map of their coverage area with the warning. One station reported to the National Association of Broadcasters that to make

identification of particular trouble spots easier, it uses a map with detachable counties in different colors which is then filmed by a preset studio camera.

The use of a preset camera is a technique which would be advantageous for all stations to adopt. A camera might be focused on an easel with a black vinyl backing, for example, on which a message could easily be written in white, or upon which a previously prepared printed poster could be placed. This allows for simple visual notification of emergencies as well as the notification of technical difficulties at the station.

Stations should keep materials for the transmission of visual emergency notifications in a clearly marked container. The location of these materials and procedures for using them should be made known to all employees who might potentially be responsible for broadcasting an emergency notification. One way of insuring this knowledge would be to hold an emergency drill periodically. In addition, broadcasters are urged to consult the National Association of Broadcasters' *A Guide to Planning for a Natural Disaster* (NAB 1974) for general suggestions for dealing with emergencies. The above methods are only suggestions which the Commission might choose to require by rule.

#### E. Requirement of audio tag

The purpose of requiring the audio tag (oral request for viewers to inform any deaf or blind persons about an emergency) with all notifications is to reach hearing impaired or blind individuals who might not be watching television, when an emergency strikes and therefore would be unable to receive a warning message. Hearing persons are often alerted to potential emergencies by the sound of sirens, wind, or rain pounding on the roof, and they are then prompted to turn on a television or radio to get additional information. But deaf people are completely oblivious to such clues, being informed only through the sense of sight. They must therefore depend on other persons to initially alert them to threatening conditions.

#### F. Transmissions pursuant to Emergency Broadcast System—EBS—Procedures

##### 1. Emergency Broadcast System—EBS

The Emergency Broadcast System is an operation through which the public is informed of national emergencies and instructed as to what actions to take. The EBS permits selected television stations to broadcast at normal power on their assigned frequencies during national emergencies, in order that the President may address the nation and that Federal, state, and local agencies may provide supplementary information. The EBS stations are required to follow the procedures set forth in 47 C.F.R. § 73.675 through 47 C.F.R. § 73.962. An EBS Checklist (see 47 C.F.R. § 73.910) summarizes the actions that must be taken by EBS stations in a national emergency upon receipt of an Emergency Action Notification (EAN), Termination or Test Message.

Three steps of the EBS procedure concern us as petitioners on behalf of the hearing impaired:

1. The initial public announcement of a national emergency (EAN Message; 47 C.F.R. § 73.933(b)(4) and 47 C.F.R. § 73.933(b)(6)).
2. The Standby Script used between the completion of the EAN message and the program material from EBS (47 C.F.R. § 73.933(7)).
3. The common emergency program originating from the EBS control point.

2. Current procedures and proposed changes  
(a) *EAN Message*: Upon receipt of an EAN message, the EBS stations are currently directed to broadcast the following announcement:

"We interrupt this program. This is a National Emergency. Important instructions will follow."

The EBS Checklist then requires that the following announcement be broadcast on priority stations:

This is an Emergency Action Notification. All stations shall broadcast this Emergency Action Notification Message. This station has interrupted its regular program at the request of the White House to participate in the Emergency Broadcast System. During this emergency, some stations will remain on the air broadcasting news and official information to the public in assigned areas. This is station (call letters). We will remain on the air to serve the (operational area name) area. If you are not in this area, you should tune to other stations until you hear one broadcasting news and information for your area. You are listening to the Emergency Broadcast System serving the (operational area name) area. Do not use your telephone. The telephone lines should be kept open for emergency use. The Emergency Broadcast System has been activated to keep you informed. I repeat . . . (Repeat announcement)

Other stations are required to broadcast a similar announcement stating their role in the emergency. The proposed amendment would require the display of a slide with the identical message in printed form being presented at the same time as the audiotransmission of the message required by 47 C.F.R. § 73.933(b)(4). The EBS should prepare a slide to be distributed to all EBS stations and filed in with the station's call letters and operational area name.

(b) *Standby Script*: Upon completion of the EAM message, EBS primary stations use a Standby Script, the text of which is contained in the EBS Checklist and which is broadcast until the program material is available. The Standby Script in current use reads as follows:

We interrupt our program at the request of the White House. This is the Emergency Broadcast System. All normal broadcasting has been discontinued during this emergency. This is station (call letters). This station will continue to broadcast, furnishing news, official information and instructions, as soon as possible, for the (operational area name) area. If you are not in the (operational area name) area, tune to a station furnishing information for your area. Do not use your telephone. The telephone lines should be kept open for official use. The Emergency Broadcast System has been activated to keep you informed. To repeat—This is station (call letters). This station will broadcast news, official information and instruction for the (operational area name) area. If you are in the (operational area name) area, keep tuned to this station for further emergency information. It is important that you listen carefully to announcements only on the station broadcasting information for your area." (Repeat as needed)

The proposed amendments would require the transmission of prepared slides containing in visual form the material content of the Standby Script.

(c) *Common Emergency Program*: Many EBS broadcasts originate from a central computer rather than from individual stations, and therefore the content and form are beyond the control of local stations. Any visual message must, accordingly, be transmitted by EBS officials. The proposal directs the EBS to immediately initiate procedures for transmitting visually the same information that is transmitted aurally. The Emer-

gency Communications Division of the Commission is currently developing, in cooperation with the National Industry Advisory Committee, a "crawl" device (whereby printed information runs across the screen) to be used on all EBS broadcasts. The Commission should stress the immediacy of the need for such a device and call for its use as soon as possible.

(d) *Local and state emergencies*: The proposal directs state and local EBS officials to also broadcast in visual form all information that is transmitted aurally, whether as a result of rule making or internal decision of the EBS.

#### VI. ECONOMIC AND TECHNICAL FEASIBILITY

There are no theoretical or technical reasons for the exclusion of the hearing impaired from the many benefits of television. Some television stations are making use of captioning equipment without any apparent difficulty. Possible techniques range from the use of a teletype machine providing a running crawl to typewritten index cards propped up on an easel. Whether large or small, a television station has many options to choose from, according to its capabilities. Since most television stations already have the appropriate equipment to provide for visual warnings, the various techniques previously mentioned can be utilized without any great expense.

Video titlers, or character generators, are one simple yet effective technique for captioning on television. Some models may be obtained for under \$2,000. (e.g. DATA-VISION, INC., Model D-1032), a relatively minimal amount in comparison to a television station's total production costs. Titling cameras, which almost every station owns, cost from \$1,000 to \$1,500, and are another basic method of captioning. Rather than being required to buy the most expensive equipment if such regulations were to be placed upon them, television stations would only have to use the means already available to them. They should realize that these and more basic methods are of relatively low cost, and will present no major burden on their budget.

Stations can utilize extremely simple and inexpensive methods for the transmission of visual emergency notifications. Blackboards may be purchased for only \$2.50 while poster board retails for 39¢ a sheet. These costs are insignificant when compared to over-all television station operating budgets. If one life is saved through the use of visual emergency warnings on television, then there can be no question as to the necessity and feasibility of making visual notifications mandatory.

#### VII. AUTHORITY AND PRECEDENT

##### A. The petitioners are interested persons

Petitioners present this petition as interested persons, pursuant to statutory and Commission authority.

The statutory authority, 5 U.S.C. § 553(e), the Administrative Procedures Act, provides that "Each agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule."

The petitioners are D.E.A.F.W.A.T.C.H. (Demanding Equal Access to Facts and Warnings Aired on Television for Citizens who are Hearing Impaired); the National Association of the Deaf (N.A.D.); the Alexander Graham Bell Association for the Deaf; and DEAF-PRIDE, Inc.

D.E.A.F.W.A.T.C.H. is a legal action group composed of students attending the National Law Center at the George Washington University in Washington, D.C. They are persons interested in the problems of the hearing impaired and are presently attempting to establish a Center for Law and the Deaf/Hearing Impaired which would deal in a coordinated and concentrated manner with the unique problems of the deaf and hearing impaired through legal and law related means. DEAFWATCH's close association with mem-

bers of the hearing impaired community and its continuing interest in the problems of the hearing impaired, particularly with regard to telecommunications, brings it to the Commission to seek relief.

N.A.D. is one of the leading organizations of and for the deaf in the United States. Its general objectives are to unite deaf Americans and to open channels of communication between them; to deliberate on the needs of the deaf as a class; and to take such action as is necessary to fulfill these needs; to promote the unique needs of the deaf by legislation, education, communication, research, and rehabilitation. N.A.D. will host the next World Congress of the Deaf in Washington, D.C. in the summer of 1975.

The Alexander Graham Bell Association for the Deaf is a national and international organization which has been dedicated, since 1890, to promoting the interests of the hearing impaired and to promoting excellence in the education of deaf children.

DEAF-PRIDE, Inc., is a local organization of deaf persons, parents of deaf persons and interested members of the community.

##### B. Authority for the Commission to act is provided by statute

The Communications Act of 1934 (47 U.S.C. §§ 151 et seq.) (herein-after, "The Act") established the Federal Communications Commission and gave it sweeping rulemaking authority to regulate and control radio communications. This grant of authority has been held to include the authority to regulate television, since 47 U.S.C. § 303 defines "radio communication" as "the transmission by radio of writing, signs, signals, pictures and sounds of all kinds."

Section 303(r) of the Act authorizes the Commission to adopt rules to effectuate the provisions of the Act. Section 303(g) of the Act gives the Commission the power to "encourage the larger and more effective use of radio in the public interest. Section 303(b) specifically requires the Commission to "prescribe the nature of the services to be rendered" by stations. Congress intended by this section to encourage and empower the Commission to take the initiative in exploring the public interest service possibilities of radio. In complying with this mandate the Commission has wide discretion in determining questions both of public and procedural policy, and in making and applying appropriate rules.

Given the specific powers granted to the Commission by section 303 of the Act, petitioners contend that it is clearly within the Commission's power to require more effective use of television emergency broadcasts by the addition of visual messages to aural bulletins.

The Commission is granted specific authority to deal with the subject matter of this petition, the safety of life and property. One of the purposes of the creation of the Commission is stated as "the purpose of promoting safety of life and property through the use of wire and radio communication. (47 USC § 151). More specifically, 47 USC § 154 (a) states: "For the purpose of obtaining maximum effectiveness from the use of radio and wire communications in connection with the safety of life and property, the Commission shall investigate and study all phases of the problem and the best methods of obtaining the cooperation and coordination of these systems."

The Commission has in fact exercised its power to promote the safety of life and property by authorizing individual broadcast stations to depart from standardized procedures in order to transmit emergency information. Prescribing specific regulations, 47 C.F.R. § 73.675 informs broadcasters of the types of situations under which they shall be authorized to present an emergency format.

The Commission also provides for and regulates the Emergency Broadcast System (EBS) (47 C.F.R. §§ 73.98-73.962) described on page 19, *supra*. EBS is composed of AM,

FM, and TV broadcast stations and non-government industry entities operating on voluntary, organized basis during emergencies of National, State or Operational (Local) levels. (§§73.903).

It is under the specific authority of 47 C.F.R. § 73.075 and 47 C.F.R. § 73.933 (EBS) that petitioners contend the Commission has the power to initiate rule making proceedings. By the amendment of these two sections to require television broadcasters to present visual messages along with their aural bulletins, the Commission would increase the effectiveness of radio communications by promoting the safety of life and property of even more millions of Americans—those who are hearing impaired.

That the Commission has the power to serve specific classes of people has been demonstrated by their mandated responsibility to serve minorities. Title 47 USC § 202 imposes an affirmative responsibility on the Commission to provide for these minorities:

"It shall be unlawful for any common carrier to make or give any undue or unreasonable preference or advantage to any particular person, class of persons, or locality, or to subject any particular person, class of persons, or locality to any undue or unreasonable prejudice or disadvantage."

While this provision applies to common carriers, which does not include broadcasters, there is an obligation to apply this practice to the hearing impaired. The present practice by the majority of television stations of presenting emergency notifications which can only be received by the hearing majority of their viewers gives an unreasonable preference to those persons and subjects the nonhearing viewers, who could only benefit from visual messages, to an unreasonable disadvantage. The Commission's statutory responsibility to provide for the safety of life and property, coupled with its affirmative obligation to insure relief to the substantial minority of hearing impaired, means, petitioners respectfully submit, that the Commission must take positive steps to insure equal access to warnings for the deaf and hearing impaired through rule making proceedings.

The Commission's responsibility to serve minorities is especially evident when it is in the public interest to provide for them. The D.C. Court of Appeals in 1970 found discrimination against a certain minority class (those who prefer classical music) in regard to radio programming balance in a community. The court reversed the Commission's refusal to hold a hearing on the question of whether a proposed assignment which would eliminate the only classical music station in Atlanta served the public interest. The court stated:

"It is surely in the public interest, as that was conceived of by a Congress representative of all the people, for all major aspects of contemporary culture to be accommodated by the commonly-owned public resources whenever that is technically and economically feasible . . . devotees of classical music . . . (are) a not insignificant portion of the people who make up Atlanta, and their minority position does not exclude them from consideration in such matters as the allocation of radio channels for the greatest good of the greatest number."

If classical music is in the public interest, then what about the preservation of life itself? Surely, life, above all else, should be held sacred. Anything which can be done to save this precious resource should be done now, with no further delay. The "greatest good" now is to give the hearing impaired what they need, and thus put them on the positive side of the balance between life and death.

In the *Citizens Committee* case, *infra*, the court clarified the meaning of "serving the public interest," which the Commission has been directed to do by Congress. The

Commission itself has also recognized the necessity of considering all aspects of a community by requiring that each commercial licensee keep in touch with the needs and interests of the community it serves. Each license application requires a description of the needs and interests which the station will serve in the license period under consideration.

Two types of programming which the Commission has recognized as necessary to meet the "public interest" of the community are weather reports and service to minority groups. With this in mind, it is obvious that the proposals for rule making fit exactly in this framework. The hearing impaired are clearly a minority group, and weather information is the major material being requested. Thus, providing visual emergency bulletins to the hearing impaired is exactly along the lines of serving the public interest which the Commission has already recognized. Almost all communities contain hearing impaired persons, and no community is immune from emergencies. The requirements which petitioners seek to have imposed by the Commission would be at least a first step in insuring consideration of the minority interests of the various communities.

The Commission has already recognized the interests of the hearing impaired minority in other ways. For example, 47 C.F.R. § 15.331 allows for the operation of an auditory training system in instituting programs for aural instruction of persons having speech or hearing handicaps. Also, the Commission has granted approval for a Public Broadcasting System experimental program of captioning the ABC News for rebroadcast several hours later and for captioning entertainment programs. These provisions, along with the 1970 Public Notice, show not only the Commission's authority to act, but also its previous recognition of the need for action in this area.

The blind, as well, have been identified by the Commission as a minority in need of special services. Most recently, radio station WETA-FM in Washington, D.C., was granted a Subsidiary Communications Authorization for special programming to serve the blind. The Washington Ear, Radio Service for the Blind and Physically Handicapped, Inc., a nonprofit organization, provides a special sub-carrier radio receiver for blind persons so that they may hear special WETA-FM broadcasts. The broadcasts are readings of articles, feature stories, editorials, and advertisements from selected newspapers.

Clearly, the proposed amendments are in the "public interest" as meeting the needs of a minority group—the hearing impaired.

#### VIII. BROADCASTERS' FIRST AMENDMENT FREEDOMS WILL NOT BE ABRIDGED BY THE PROPOSED REGULATIONS

Although requiring visual emergency messages would serve the public interest, by fulfilling the needs of handicapped minorities, some observers have suggested that this would entail unwarranted government regulation in the precious arena of First Amendment freedoms. The Communications Act provides that "no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio communication." However, such a regulation as the petitioners propose does not at all interfere with what information or ideas are transmitted by broadcasters, but concerns only *how* they are transmitted. The proposed regulation does not require the transmission of any messages originating at the local level, nor does it limit what may be transmitted. Rather, it simply requires that once a station chooses to aurally transmit an emergency notification, it must transmit the same message visually. The EBS regulations already prescribe the content of aural EBS messages;

the proposed regulation of EBS would simply require the same messages to be presented visually. There would be no chilling effect upon the artistic value of the programming, nor any regulation of the broadcaster's judgment.

Moreover, despite the prohibition of government censorship by both the First Amendment and the Communications Act, there are already a variety of Commission actions which constrain the broadcaster's freedoms and flexibility in utilizing a station for communications. For example, the Commission requires that the programming of a licensee be in the "public interest" and has indicated a preference for certain types of programming. The Commission also regulates network domination of television programming by restricting prime time access.

When television stations fail to serve the needs of the public by not voluntarily implementing techniques which can save many human lives, the Commission is not only permitted, but obliged, to impose such techniques on the stations.

#### IX. THERE HAVE BEEN MANY REQUESTS FOR COMMISSION ACTION

Other government agencies have also recognized the needs of the hearing impaired. One early call for improvements in television for the hearing impaired was voiced in December 1971, at the First National Conference on Television for the Hearing Impaired, sponsored by HEW. In attendance were representatives of the deaf and hard of hearing, television stations, broadcasters, engineers, educators, advertisers, and the Federal Government. The Conference entailed a pooling of resources in order to bring about the development of captioned television programs to serve the needs of the hearing impaired population. Participants highlighted existing problems and recommended numerous remedial strategies. The Conference ended on a hope for "a new dimension in the lives of the hearing impaired."

At the National Conference, Capt. L. R. Raish, of the Office of Telecommunications Policy (hereinafter OTP) in the executive branch, offered the following words: "There is interest and encouragement on the part of persons high in the Administration in seeing that technology, particularly telecommunications technology, is applied to aid the handicapped."

The former director of OTP himself, Clay T. Whitehead, encouraged the Commission on December 2, 1971, to expand the use of captions in television broadcasting, stating, "the Administration strongly supports . . . actions which foster the interest of the broadcast industry, such as was done by the Commission's Public Notice (FCC 70-1328), in offering telecasts that provide a means whereby warnings and emergency bulletins and other services could be made available to viewers with impaired hearing."

An August 1, 1973, letter from former Commission Chairman Dean Burch to Mr. Whitehead discussed the comparative advantages of two types of captioning methods which present printed words on the television screen in addition to the information provided aurally. One of these methods is closed captioning, which can only be seen on a television screen if there is a special decoding device attached to the television set. The other is open captioning, which is received by all television sets turned on to a particular station which employs a captioning device. Chairman Burch closed his letter to Mr. Whitehead by stating that closed captioning was not feasible for emergency notification:

"It seems apparent that captions providing such information should be available to all persons of impaired hearing—not just to those whose receivers are especially equipped to display encoded captions." (emphasis added)

Yet, four years after the Commission's Notice, and despite these various statements of

support, no substantial progress has been made toward presenting visual emergency notifications. More than encouragement appears necessary to meet the pressing needs of a substantial segment of the population. Many deaf organizations have been actively involved in efforts to change the existing procedures which most television stations follow in broadcasting emergency notifications. The Council of Organizations Serving the Deaf (COSD) in August, 1972, wrote to the National Association of Broadcasters, asking that they include in their standards a requirement that aural Emergency Broadcasting System messages be accompanied by visual messages. Although NAB failed to institute such standards, EBS is now developing a "crawl," where words cross the screen at the same time the oral announcements are being made.

Because of the failure of television stations to regulate themselves in the manner called for by the Commission, other government agencies, and deaf organizations, the hearing impaired continue to be deprived of the right to emergency notifications. This blatant disregard to the Commission's Notice has prompted numerous letters from individuals and organizations to the Commission urging the adoption of more stringent regulations. The response has been that the situation has been under active consideration by the Broadcast Services Subcommittee, National Industry Advisory Committee.

Still, no action has been taken by this Committee. Therefore, in view of the unsatisfactory developments in this area, it is now the Commission's obligation to "begin rule making looking toward the adoption of minimum requirements."

#### X. THE COMMISSION SHOULD FOLLOW OTHER GOVERNMENT ACTIONS IN SERVING THE NEEDS OF HEARING IMPAIRED

Requiring visual emergency bulletins to meet the needs of the hearing impaired, the Commission would be following the example set by other bodies of the Federal Government in providing for the special needs of the handicapped. Congress has shown its concern with these needs by establishing a comprehensive program for the handicapped through the Vocational Rehabilitation Act (87 Stat. 355). The purpose of the act is to:

"Provide a statutory basis for the Rehabilitation Services Administration and to authorize programs to develop new and innovative methods of providing rehabilitation services to handicapped individuals through research, special projects, and demonstrations; . . . conduct various studies and experiments to focus on long neglected problem areas; . . . enforce statutory and regulatory standards and requirements regarding barrier-free construction of public facilities and study and develop solutions to existing architectural and transportation barriers impeding handicapped individuals."

The Act also establishes a National Center for Deaf-Blind Youths and Adults to, among other purposes, "aid in the conduct of . . . activities which will expand or improve public understanding of the problems of deaf-blind individuals."

Title 45 USC part 150, under the authority of HEW, provides for the production and distribution of captioned films for the deaf, to provide them with enriched experiences so that they may be brought in better touch with the realities of the environment.

In addition, Congress funds Gallaudet College, in Washington, D.C., the only accredited four year college for the deaf in the world.

Although not specifically directed towards requiring visual emergency messages, concerted efforts are being made by the Bureau of Rehabilitation Services of HEW, Public Broadcasting System and the National Bureau of Standards, to perfect a closed

captioning system. Such commendable efforts demonstrate a growing awareness of a dedication to the potentialities of television for the hearing impaired. But, the Commission cannot wait for these methods to be developed before it acts. It has the authority, and television stations have the ability, to immediately offer relief to the hearing impaired population by providing them with the necessary visual information in times of emergencies.

It is respectfully submitted that the Commission has had adequate time to consider the situation. The moment is ripe for the Commission to impose standards on television stations to insure all hearing impaired individuals their right to receive visual emergency notifications on television.

#### XI. CONCLUSION

The shocking failure of television to perform its duty to the hearing impaired population is self-evident. These millions of Americans are denied a life of security while television's neglect continues. The multitude of hearing impaired, the array of potential emergencies, and the culpability of television broadcasters are presently producing profoundly devastating results. Unless broadcasters provide the missing link—visual emergency bulletins—the hearing impaired will remain physically and psychologically vulnerable to disasters.

The time for talk has passed. The Commission must now act on its promises and help the hearing impaired, who in this case cannot help themselves. The simple procedures and low cost involved in implementing the petitioner's proposals for visual notifications in emergencies, require only minimal effort by broadcasters. In view of the lives that visual notifications would save, is there any question as to the proper path of action? Must the hearing impaired continually be discriminated against in the field of telecommunications?

The sacrifice of lives must stop now. Since television broadcasters will not voluntarily do their part, the Commission must, we submit, step in and initiate rule making proceedings requiring television stations to add visual messages to their emergency notifications.

For these reasons, the petitioners respectfully request the Federal Communications Commission to adopt, as part of its Rules and Regulations, the proposed standards for the visual transmission of emergency notifications.

#### ENERGY SURVEY

Mr. DOLE. Mr. President, recently I received an energy use survey conducted by the eighth grade science class of Burr Oak, Kans. I believe it is a useful indicator of feeling about the energy problem in Kansas.

Burr Oak is a community of 473 people, most of whom are engaged in farming or farm-related business. As such, it is representative of a large portion of my constituency in Kansas.

I find this survey to be useful in two respects. In the first place, it demonstrates the concern which Kansans of all ages feel about our current energy problem. Certainly, the many hours which these students spent in gathering and compiling this data indicate Kansas youth's desire to take positive action toward meeting the problems of our day. I find it encouraging to note that students are thinking seriously about our energy supply.

#### CONCERNED ABOUT ENERGY

Second, this survey reflects the comments I have been hearing from many Kansans on the energy problem. I note the serious doubt about the President's energy program.

The sentiment against gasoline rationing—73.9 percent—is even stronger and I have strongly advocated alternative measures to save fuel resources so that rationing will not be necessary.

My own efforts in the Senate, particularly in the Senate Finance Committee—have been directed toward meeting these concerns. But I am more and more convinced after hearing testimony in the committee that no meaningful program to reduce energy consumption can be painless.

#### DISCRIMINATION UNWANTED

The discriminatory 55-mile-per-hour speed limit registers strong opposition, as I would expect. In Kansas and other Western and Midwestern States, we are expected to reduce our speed by about 20 percent while new Englanders and other easterners by and large have not been required to reduce their speed at all. The Congress and administration seem to be saying to Westerners and Midwesterners, "you slow down and save gasoline so that Easterners can drive at the speed they have been in the past."

That is why I have attempted to make the 55-mile-per-hour speed limit more equitable, keeping in mind both the needs and desires of Kansans who must travel much longer distances in order to carry on their businesses than those living in urban areas.

Not surprisingly we now see New England officials and representatives protesting about discrimination against them because of the oil import duty program. This seems especially ironic to the junior Senator from Kansas since testimony in the Finance Committee clearly shows that the New England area would suffer less from the oil tariff than other parts of the Nation. That is because New England imports mostly refined petroleum products for which there is no tariff and because the Federal Energy Administration has previously had a subsidy for imported refined product under the entitlement program which has now been ended.

And all these protests are even harder to understand when easterners have been getting natural gas from Kansas and other Midwestern States that has been held at artificially low prices for the past 20 years.

But the dialog going on in Congress now is good and I hope we will be successful in finding a program to reduce our dependence on imported oil as soon as possible at the minimum level of economic pain.

Because I feel that the work of the Burr Oak science class has a meaningful significance, I ask unanimous consent that their survey be printed in the Record.

There being no objection, the survey was ordered to be printed in the Record, as follows:



A

## POINT PAPER ON BIOLOGICAL EFFECTS PROGRAM

### A. CHRONOLOGY OF OTP ACTIONS AND RELATED EVENTS

1. December 1968 - The Electromagnetic Radiation Management Advisory Council (ERMAC) established.

Function: - Advises Director on "side effects" on the environment, biological and physical, and the adequacy of control of nonionizing electromagnetic radiation.

Council Members (listed in attach. #1): - Have expertise in a wide variety of relevant disciplines i.e., engineering and the physical and biomedical sciences (academe and industry). Includes Agency representatives as observers.

2. March 1969 - First ERMAC Meeting.

Primary Activity: - A comprehensive assessment of knowledge, programs, and potential problems vis-a-vis biological effects and hazards. (Government agencies participated and contributed.)

Result: - Concluded a) effects of nonionizing radiations on man are not known with sufficient confidence and b) on-going efforts were inadequate to resolve current and foreseeable issues.

3. December 1971 - ERMAC recommended a coordinated Government program to establish a sound scientific basis for assessing hazards and determining remedial measures as warranted.

o Recommended \$10-15M/year to commence by FY 74.

4. January 1972 - Program coordinated with the heads of agencies, OST and OMB for implementation.
5. April 1972 - OTP formed an interagency working group (Side Effects Working Group of the IRAC) as a intra-governmental coordinating mechanism. Members were designated by the heads of agencies. This group interacts with the ERMAC (most as ERMAC observers) and provides a focal point within the Government for treating matters of common concern and interest and information exchange (Attachment 2).

Subsequent ERMAC/OTP activities include:

6. Summer/Fall 1972 - Conducted technical and programmatic review of individual agency programs to assess FY 73 and 74 efforts.

7. Summer 1973 - Broad overview of overall program content with respect to recommended areas of activity and priorities (Attachment 3).
8. Currently - Seminars to examine status and progress in key areas; e.g., nervous system and behavior, measurements of EM levels in various environments, etc., (Attachment 4).

B. PROGRAM FACTS

1. Structure - Multiagency, coordinated by OTP (Program relationships and agency roles, Attachment 5).
  - o 13 agencies with active programs, however, approximately 90% of activity and dollars are in 3: 1) DOD, 2) HEW and 3) EPA.
2. Funding - Via individual agency appropriations (independently funded efforts) - no single appropriation. (In most cases this is contained in larger line items and not separately identifiable).
  - o Pre OTP total Government expenditures estimated at \$4M (FY 72) v.s. \$10-15M/year recommended.

SUMMARY  
(Approximate \$M)

<u>Totals</u>	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>
Recommended Agencies	-- 6.0	10.6 7.2	15.2 8.8 (anticipated)

3. Principal research areas include:

- \* Genetics/Hereditary, and Development
- \* Nervous System  
Behavior/Psychology
- \* General Health  
Epidemiology  
Clinical Studies
- \* Mechanisms of EMR interaction with living organisms  
Ocular Effects  
Cardiovascular Effects  
Metabolism/Endocrinology/Biochemical Effects  
Histology/Cytology  
Instrumentation and Facilities  
Absorption/Dosimetry  
Environmental and Safety Studies

\* = Priority areas -- also, measurement techniques instrumentation and dosimetry which are essential for ensuring commonality of research, relating effects to exposure levels, - and extrapolating laboratory findings from one animal to another and to man.

4. Frequency Range - OHZ up through 300 GHz, with priority emphasis in the microwave region followed by the lower frequencies. (Distribution of research by frequency in 1974 annual report).
5. Other Program Data -
  - o FY 74 - The Program consisted of approximately 114 individual projects 67 inhouse Government and 47 non-Government. (Details in attachment 6).
  - o FY-75 (Current) - 106 projects (in Government and non-Government are roughly equal).
  - o Projects include several jointly funded efforts supported by more than one agency.

C. RELATED INFORMATION

1. International (ref: 1974 report, pg. 20) -- There has been considerable interest in this area (research, health/environmental safety and standards) on the part of other countries and international organizations concerned with biomedical research health, engineering and communications e.g., CCIR, ITU, URSI, World Health Organization, NATO, AGAR, among others.

Several events involving U.S. include:

- o October 1973 - A small multi-multinational symposium on microwave effects was held in Warsaw, co-sponsored by the Polish Ministry of Health, World Health Organization (WHO) and BRH. It afforded one of the first opportunities for direct contact and scientific exchange between Eastern and Western investigators.
- o 1972 to Present - As part of detente, under the US/USSR agreement to collaborate in environmental health (coordinated for the U.S. by Dr. Rall of NIEHS), discussions have been underway to develop a collaborative activity in the area of microwave effects. This has included the exchange of information and scientists.
- o 1974-WHO Activity - BRH has been designated as the WHO Collaborating Center for Standardization and Protection Against Nonionizing Radiation for a 3 year period. The center performs a number of functions to assist WHO in this area (Attachment 7).

Planned:

- o 1975 - USNC/URSI (National Research Council), Commissions I & VI, is planning to include an expanded session on biological effects in its October 1975 meeting. This will be a continuing, annual "Series".

- o Dr. Czerski, Poland, is organizing a limited (approximately 10-man) meeting of noted Eastern and Western Scientists specializing in low-level studies to discuss international safety standards and develop a recommendation in this regard. (Recommendation from an assembly of such recognized scientists will carry considerable weight. Ross Adey of ERMAC has been approached).

## 2. Standards

Government agencies with standards authority include: HEW/BRH - product emission, DOL/OSHA - occupational, EPA - environmental. Additionally, states and the military can develop standards for their own use which must comply with OSHA's criteria. There are also a number of international bodies which develop international standards.

- o Current U.S. Government Standards:

1. Occupational Standard - OSHA standard (adopted 1971/2) applicable to employers in the private sector. (Section 19, E.O. 11612 and E.O. 11807 make these mandatory for federal employees including the military who must be protection to at least these levels, (maximum permissible exposures based on  $10 \text{ mc/cm}^2$  as averaged over any 6 minute period).
2. Product Emission Standard - BRH microwave oven standard. Ovens may not emit (leak) over  $1 \text{ mw/cm}^2$  at time of manufacture and  $5 \text{ mw/cm}^2$  subsequently for the life of the product (measured 5 cm from front of the oven).

- o Unofficial-Concensus Standard:

American National Standards Institute (ANSI) - A widely recognized, voluntary body with members from Government, industry and academe. Issued a safety standard in 1966. It was reviewed and reissued this year. (based on  $10 \text{ mw/cm}^2$ —this standard was essentially adopted by OSHA as an official occupational exposure standard).

Note: There is no official safety standard applicable to the general public at this time.

## 3. Legislation

Existing legislation with application -- includes the authorities under which the BRH and OSHA standards were issued:

- o "Radiation Control for Health and Safety Act of 1968" (PL 90-602) Administered by HEW (Senate Commerce Committee-Magnuson, Tunney).

- o "NEPA of 1969" (PL-91-190). Requires environmental impact assessments and statements.
- o "Reorganization Plan No. 3 of 1970." Establishes EPA. EPA has authority to establish environmental standards (including radiation).
- o "Occupational Safety and Health Act of 1970" (PL 91-596) Administered by DOL/OSHA.

Recent:

- o "Energy Reorganization Act 1974" (PL 93-438) Created the Energy Research and Development Administration (ERDA) which will carry out energy associated research. This will probably include the impact of various energy generation, and transmission schemes and, therefore, associated biological effects -- particularly as regards high voltage electrical transmissions associated with nuclear power plants.

D. CURRENT ISSUES AND PROBLEMS

1. Exposure Safety Standards

- o Lack of protective standards for the general public ours are occupational only ( $10 \text{ mw/cm}^2$ ). Public standards, by tradition, are lower e.g., possible  $1 \text{ mw/cm}^2$ .
- o Discrepancy ( $\times 1000$ ) between US ( $10 \text{ mw/cm}^2$ ) and Soviet ( $10 \text{ microwatt/cm}^2$ ) standards and the increasing focus on standards in various international organizations and forums. (Extremely stringent standards could affect U.S. operations, particularly outside the U.S.).
- o Lack of US exposure standards for frequencies below 10 MHz (USAF is recommending a  $50 \text{ mw/cm}^2$  standard. As presently envisioned, it would apply up to 30-50 MHz. This overlaps the low end of the spectrum covered by the present OSHA standard and would require a petition to OSHA to modify their current standard).

2. Legal actions against Government and industry for monetary compensation alleging injury due to RF/MW exposure. (Awards have been made for cataracts).

NB: The foregoing can have considerable economic and operational impact.

3. Other Problems

- o Lower than desirable funding levels and the lack of effective funding mechanisms or agreements with the agencies and/or OMB to remedy.

- o Lack of sufficient research with long term exposures (e.g. months to years) including follow up studies. (Requires continuity and commitment of funds beyond year to year basis.)
- o Biological Safety associated with electrical power exposures (related matter but not directly an OTP domain.)

The growing trend toward higher voltage transmissions has resulted in public concern and efforts block the use of high power lines because the biological effects are not known. Fragmentary research evidence suggesting injurious or undesirable effects is cited in this regard. Some aspects of the program research, particularly that at very low frequencies, has limited relevance. (Widely publicized hearings are now pending in N.Y., and there has been a number of other such cases.)

There has been little research in this area and it has been difficult to identify a Federal Agency with cognizance and/or responsibility in this area. OTP actions include: contacting the FPC, ERDA and EPRI (industry's research organization) on this matter. *Recent correspondence affirms ERDA has ball.*

B

## ERMAC MEMBERS

1. Dr. W. Ross Adey *MD - biomedical researcher*  
Professor, Anatomy and Physiology  
University of California, Los Angeles  
Director Space Biological Laboratory, Brain Research Institute
2. Professor Merrill Eisenbud *public & environmental health (ionizing radiation background)*  
Professor and Director, Laboratory for  
Environmental Studies, Institute of  
Environmental Medicine, New York  
University Medical Center
3. Harold Gauper, Jr. *- Senior Engineer*  
~~Manager~~, Electrical Interference and Transients  
Program, Research and Development Center  
General Electric Company, Schenectady, New York
4. Dr. William Taylor Ham, Jr. *- biophysics*  
Professor and Chairman Department of Biophysics  
Virginia Commonwealth University
5. H. Janet Healer *- Biosciences*  
Consultant, Bioscience Programs  
Dover, Massachusetts
6. Dr. Charles M. Herzfeld  
Technical Director, Space and Defense Group  
IT&T  
Nutley, New Jersey *until 11/74 (now consulting only)*
7. Dr. Samuel Koslov, Special Assistant *physics, R&D management*  
Office of Assistant Secretary of Navy  
The Pentagon
8. William Waldon Mumford, Engineering Consultant *- Microwave Engineering*  
Morris Plains, New Jersey
9. Dr. Herbert Pollack *MD, PhD. - physician, biomedical research programs*  
Professor Emeritus of Clinical Medicine  
George Washington University  
Washington, D.C.  
Consultant, Institute for Defense Analysis

9

SIDE EFFECTS WORKING GROUP (IRAC)  
- chaired by OTP

This working group is concerned with the side effects of nonionizing electromagnetic radiation -- both biological and nonbiological. However, its primary emphasis to date has been on the biological considerations. This is reflected in its membership which consists of each agency's point of contact for their bioeffects activities.

The group's principal function is as the intra-Governmental coordinating body for the multiagency Federal Government Program to assess the biological effects of nonionizing radiations throughout the radio spectrum. It serves as a focal point for treating matters pertaining to the research program and other related items and provides a forum for the exchange of information of common concern or interest in this area.

For example, a major undertaking has been documenting ongoing research through the Federal Government at the project or work-unit level. This helps the agencies to be cognizant of each others undertakings and provides a basis for tracking, reviewing, and analyzing program activities. Another project was to identify the capabilities and resources of State and Federal agencies to conduct EM field measurements in cases of suspected exposures. These capabilities, have been documented by the Environmental Protection Agency, which serves as the principal point of contact for Government agencies requiring this information and are referenced in the OTP Manual for Government use of the spectrum. A similar effort is being undertaken to identify exposure facilities for biological research as a basis for assessing facility requirements and to facilitate interagency arrangements to share use where practicable.

Other functions include reviewing activities pertaining to standards and commenting on proposed standards where appropriate; providing assistance to agencies reviewing proposals in this area; providing support and input to efforts to develop a collaborative US/USSR activity in the area of information on technical meetings, recent publications, and other relevant matters.

D

SUMMARY OF ERMAC OVERVIEW OF THE PROGRAM TO ASSESS  
BIOLOGICAL EFFECTS OF NONIONIZING RADIATION

The Office of Telecommunications Policy has encouraged an interactive program between concerned Government agencies based on independently funded programs of research into biomedical effects of nonionizing radiation.

The status and progress of the current Program effort has been overviewed by the ERMAC from the perspective of the basic Program objectives. Activities in various areas of investigation were examined in an attempt to determine the extent to which they, and the directions they portend, will provide answers needed to achieve those objectives in a practical time frame. The review was predicated on the understanding that we are, as yet, in the formative stages of establishing a cohesive, coordinated research effort of reasonable critical mass in a relatively new and complex interdisciplinary field.

Program Objectives:

It is the purpose of this Program to establish a rational scientific foundation for use in determining potential hazards to man and his environment in order to assure their protection while avoiding unnecessary restriction of man's ability to use this energy.

This requires that:

- a. Biological effects of electromagnetic radiation (0Hz-3000 GHz) be determined as a function of frequency, intensity and duration of exposure.
- b. The health or ecological significance of any effects be determined.
- c. Appropriate control measures including safety criteria and standards be determined and developed, as may be warranted.

Findings of ERMAC Overview:

- o The present funding level for the program as a whole (\$6.0 million, as compared to the originally recommended \$10.6 million) is too low with respect to current and foreseeable needs and is not responsive to the level of public, professional, or governmental concern. The present level of effort requires amplification if answers are to be produced in a realistic time frame.
- o There has been a buildup of activity in many of the currently recognized critical program areas.
- o The relative distribution of effort by major areas of activity is reasonably appropriate with respect to program objectives and priorities as outlined in the ERMAC program recommendations of December 1971.

- o The research effort in most areas of investigation is excessively fragmented. It consists of a number of diverse, currently unrelated individual efforts. This is frequently characteristic of a new and complex field at an early stage. However, better focusing, coordination and integration of resources is necessary as the program progresses to ensure meaningful results.
- o Most of the current research appears to be concerned with key priority areas, namely: genetic effects, central nervous system effects, gross physical effects, and underlying mechanisms of interaction, (with emphasis on power levels below  $10 \text{ mw/cm}^2$ ) at microwave and other frequencies associated with major electronic systems.
- o The portions of the above work likely to yield results in the near term (1-3 years) v.s. longer term (3-10 year period) are estimated to be approximately equal.
- o In general, most of the current work involves the short term effects of brief exposures; including multiple exposures over relatively short periods of time. Greater emphasis is needed on repeated and continuous exposures over longer periods of time (particularly during the most vulnerable periods of the animal's life), and on observation for latent effects. Truly long-term (chronic) exposures involve a considerable commitment of resources and time but consideration should be given to how this might be accomplished in the future (perhaps by the use of some dedicated facilities) and some planning of parameters of interest, protocols, etc. should be initiated.
- o The distribution of effort with respect to frequency within the various program areas, roughly follows the overall frequency priorities recommended in the basic program. Concentrations of effort are apparent in the microwave region (particularly at 2.45 GHz) and at ELF with some work in the VHF, less at HF and very little in the LF and MF regions. While this is appropriate for the present, future considerations should not overlook the LF and MF regions which include a variety of high powered systems and extensive use for AM broadcast.
- o There is a need for greater emphasis on the role of pulsed or other modulated radiations as well as more comparative studies of these modes with CW radiation.
- o Instrumentation and methodologies to characterize the EM field and its interaction with exposed material continues to present difficulties and many unresolved problems remain. There is a pressing need for sensors and instrumentation (i.e. implantable

electrodes) to measure biological parameters of interest which can be dependably used in RF fields without producing field distortions or concentrating the energy. Standardization of terminology and measurement protocols are needed to permit comparison of experiments and more uniform definition of exposure in non-experimental situations. Work is also urgently needed on factors to permit scaling from one life form to another.

- o Although definitive results are not to be expected at this early stage of the program, there have been some tentative and as yet unverified observations of effects in certain nervous system and behavioral indicators, developmental processes, and in some other areas. The validity, circumstances, causal relationships, and significance of these observations have yet to be determined but they underscore the need for additional research. Effort should be focused sharply on resolving these questions.

Recommendations:

- o The importance of determining the following is reemphasized:
  - a. The effects of long term low level exposures and thresholds for any effects.
  - b. Effects of different EM exposure regimes (frequencies, intensities, modulations, time, multiple frequencies, -- including EMP);
  - c. The effects of EM exposures in combination with other environmental and biological factors, e.g., age, sex, etc.
  - d. The possible existence of effective mechanisms of interaction in addition to or other than thermal deposition.
- o To avoid excessive diffusion of effort and dissipation of resources, continuing coordination of the various program areas will be necessary. Toward this end, it is suggested that:
  - 1. The need for effective program management within each agency be reemphasized as a step toward resolving the issues outlined herein.
  - 2. OTP and ERMAC meet soon with the principal agency program officers to discuss the above observations, comments and concerns, and solicit their views.

3. Thereafter, ERMAC hold reviews of activities in each significant program area (across agency lines). Specialized subcommittees should be considered to assist in the scientific evaluation of work in these areas. These reviews should consist of presentations by those directly involved in, and responsible for, the research after meeting with each other to prepare their view of the status, significance and directions of this research. This should serve a twofold purpose:
  - a. The interaction among the actual participants will, of itself, help achieve a more cohesive and focused effort.
  - b. It will provide an opportunity for evaluation in greater technical depth and for encouraging a more coordinated approach to this work.

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E

SUMMARY OF THE ERMAC WORK SESSION ON NERVOUS SYSTEM AND BEHAVIORAL EFFECTS  
OF NONIONIZING ELECTROMAGNETIC RADIATIONS

On October 31 and November 1, 1974, the Office of Telecommunications Policy held a workshop/seminar with the Electromagnetic Radiation Management Advisory Council (ERMAC), invited specialists and investigators, to review the present state of knowledge, progress and research pertaining to possible nervous system and behavioral effects of nonionizing radiations; a principal area of investigation in the overall multiagency program to assess biological effects of these radiations. The agenda, noting ERMAC members and specialists, is included as Attachment 1. A total of fifty-four individuals, including the agency representatives, attended as indicated in Attachment 2. The meeting, which was open to the public was held in Room 1129, 1800 G Street, N.W., Washington, D.C. and was chaired by Mr. W. Dean, Jr., OTP Assistant Director for Frequency Management.

As a basis for discussion, several investigators whose work represents some of the different approaches to research in this area, were invited to outline their current studies and views based on research-to-date. The following summarizes presentations and comments; the views and conclusions are those of the investigators, based on the present state of knowledge. In many cases, research is still in progress. They should be viewed in this context and do not necessarily represent the views of any sponsoring agency.

- o Dr. Donald Galloway, Bureau of Radiological Health, Food and Drug Administration, PHS.

Dr. Galloway described his current research on microwave radiation effects on behavior in monkeys. As background, he briefly summarized behavioral research at the Bureau of Radiological Health over the past 4 years, using operant conditioned rhesus monkeys to test the effects of RF radiation on a variety of tasks.

Noting that reports of central nervous system (CNS) responses frequently did not involve direct or exclusive CNS exposure, this work has been concerned with depositing energy into the brain. Early goals were to design a system for irradiating the animals' heads and to develop dose-response curves for any observed effects. Both of these have been difficult to accomplish and efforts are continuing. Successive generations of exposure systems have been redesigned. The work discussed primarily used two CW systems-- a 383 MHz RF resonant cavity and a 2450 MHz diathermy-type applicator which fits on top of the monkey's head.

Difficulties with the diathermy-type applicator, in getting energy into the brain without producing skin burns, resulted in abandoning this approach in favor of a new wave guide-type exposure system which

has been completed but not yet tested. This system will permit head exposures at 383, 915, and 2450 MHz and facilitate calculation of power absorbed in the head.

A general suppression or decrease in behavior (task performance-- 2 hour sessions) was observed at doses in the range of 20-30 mW/gm of brain. Various behavioral tasks were used in these studies (i.e., a repeated acquisition task, serial choice reaction time (tracking task) and a delayed match-to-sample task (memory test)). This behavior appeared only during irradiation and could not be observed in animals tested on the following day. A rather distinct threshold appears to occur around 20 mW/gm levels.

A principal direction of this research at present has evolved from the observation (during tests with one task--tracking) that monkeys appear to become sleepy, regaining normal alertness when the radiation is turned off. (Electroencephalography was attempted but abandoned because of electronic difficulties and artifacts when the animal was working). Since sleep seems correlated with serotonergic fibres of the brain, studies have been undertaken to explore possible interactions between a serotonin depletor and MW radiation. Initial studies with PCPA established doses of this agent and MW which, administered separately, did not effect behavior on one of the experimental tasks, but when given together did affect performance in what appears to be an additive and not a synergistic phenomenon. Some complications associated with this approach were noted (e.g., the animals appear to develop a tolerance to PCPA, it takes several days to metabolize, etc.) Other agents are currently being used and studies of turnover rates of other substances (e.g., norepinephrine and acetylcholine) in brain tissues are being contemplated for future studies.

In summary Dr. Galloway made the following points:

Under the conditions of his experiments, the observed effects will not occur except when the task is performed simultaneously with irradiation. The subject's performance appears fully normal when the task is repeated the day following irradiation. In experiments with one task (tracking), no change in performance was observed during the first couple of days of several days' testing; but changes were observed by the third, fourth, or fifth day, suggesting the possibility of cumulative effect. At this stage, there appears to be a rather distinct threshold around 20-30 mW/gm. He also commented that he would like to see some empirical data relating power densities of incident fields to absorbed dose.

- o Dr. Suzanne M. Bawin, Space Biology Laboratory, Brain Research Institute, UCLA, California

Dr. Bawin described research at the Brain Research Institute involving electroencephalographic, behavioral and biophysical/chemical studies of CNS responses to very low frequency (ELF region) radiation and modulated and CW VHF radiations (e.g. 147 MHz) at low power densities.

She first reviewed ELF studies by Dr. Medici into the response of monkeys, trained to perform a task involving subjective estimation of time, exposed to 7, 45, 60 and 75 Hz at several field strengths (1, 10, 56 and 100 V/m) in various combinations, in a series of experiments. Animals (3) with chronically implanted EEG electrodes and unimplanted animals (2) were tested during 3 hours of 4 hour exposure periods. The test was repeated four times for each of the five monkeys for each field condition. Similar changes in task performance behavior (shortening of the interval between responses) were observed in both implanted and unimplanted animals with some of the exposure conditions. A series of experiments with 7, 45 and 75 Hz at 1 and 10 V/m showed maximum effects at 7 Hz. Effects appeared more widespread (75 Hz, as well as 7 Hz) and field/no-field differences were much larger with higher field strengths. Results at 100 V/m suggested that field exposure at these voltages was so permeating that it affected tests 24 hours later. (Special post-run control tests were more normal than the interspersed random control tests.) Additional experimentation will be required to clarify.

Two principal trends were observed in EEG's obtained. During irradiation a sharp decrease was observed in the very low frequencies (e.g. 1 and 2 Hz) and, although not very pronounced, any naturally occurring rhythm presented (in the irradiation) during the task seems to be enhanced (e.g. 15 Hz in the central medianum or 7 Hz in the hippocampus).

VHF studies with weak electromagnetic fields (147 MHz,  $1\text{mW}/\text{cm}^2$ ) amplitude modulated at brain wave frequencies were found to influence spontaneous and conditioned electroencephalographic patterns in exposed animals. The hypothesis was offered that the electrical forces induced in brain tissue by the VHF fields, could trigger local conformation changes in the macromolecules of the outer zone of the neuronal membrane, resulting in small displacement of the surface bound cations. Experiments were conducted to study the calcium efflux ( $45\text{Ca}^{2+}$ ) from the neonate chick brain, in vitro, following irradiation with the VHF fields amplitude modulated at various frequencies. Modulation frequencies lower than 9 Hz and higher than 20 Hz failed to induce any change in the calcium efflux, by comparison with unirradiated control brains. By contrast, exposure to fields modulated at 9, 11, 16 and 20 Hz lead to a 10-20% increase in  $45\text{Ca}^{2+}$  efflux which is statistically significant ( $p < 0.01$ ). Additional experiments with brains poisoned with sodium cyanide ( $10^{-4}\text{M}$ ) produced identical results. These findings suggest that the induced release of the bound  $45\text{Ca}^{2+}$  is independent of any

ongoing metabolism. This response (increased calcium efflux) was not observed in exposed muscle tissues, at least at these same frequencies.

Summarizing her conclusions at this stage, Dr. Bawin stated that behavioral, electrophysiological and chemical changes in the brain have been observed in these experiments. It is planned to continue research in the areas presented--in her own case, particularly behavioral studies in cats, to develop additional data and understanding of the nature of the effects observed. However, she emphasized her own interest and that of her colleagues in extending their studies of mechanisms of field interaction with neural tissue. An overall goal is to use electromagnetic fields, not only to detect and develop an understanding of biological effects or changes, but also as a tool in brain research for studying brain function wherein she views these fields as having great potential value. In closing she stressed the importance of developing our knowledge of mechanisms of interaction.

- o Dr. James Frazer, U.S. Air Force School of Aerospace Medicine, Texas. and Dr. William Stavinoha, University of Texas.

Drs. Fraser and Stavinoha discussed studies primarily concerning brain biochemistry and effects of radiation on various neurotransmitter substances, their turnover rates, and metabolism. Dr. Frazer noted that the Air Force interest in this research is influenced by DOD guidelines requiring it be oriented to look at exposures and operational considerations associated with transmitters operated by the Air Force. Their principal work on nervous system involves studies of neurochemical changes primarily with HF (3-30 MHz) fields.

A methodology was developed for determining neurochemical changes which permits more rapid inactivation of whole animal brains than current methods. Ideally, this requires extremely rapid inactivation (e.g., tenths of a millisecond), commensurate with the dynamics of neural response. The best techniques available are too slow (e.g. 1 sec) leaving plenty of time for enzyme turnover between interrupting the circulation of the brain and removing it for testing. A series of four of 2450 MHz applicators have been developed to inactivate brain contents. Successively shorter inactivation times have been achieved down to 0.3 seconds.

Studies have also involved determining biological reactions to different kinds of field impedances. With HF and other low frequencies, two kinds of near fields are involved and it was therefore necessary to develop an exposure system capable of simulating the different kinds of relationships between electric (E) and magnetic (H) field vectors which are produced by actual operating systems. This gives a full scan of field impedances and helps with the problem of matching impedances in different size animals.

In other early experiments, differences were observed between the lymphocyte division response in animals (rhesus monkeys) exposed to 5000 V/m fields (total power density  $\cong 1.3$  W/cm<sup>2</sup>, absorbed power  $\cong 15$  mW/gm) and paired control animals measured immediately after exposure. Three days later there is a factor of 10 increase in the number of division figures in lymphocytes taken from exposed animals. The same lymphocyte response was observed at three HF band frequencies. Exposure at the highest frequency (26 MHz) produced significant increases in core temperature, the two lower frequencies (19 and 10.5 MHz) did not, indicating that temperature was not the driving factor in the kind of response.

In related experiments with mice exposed to VLF fields (25 kHz, 15,000 V/m, 11 amps/m), tritiated thymidine uptake measurements in lymphocytes showed a 2-5 fold increased incorporation in the lymphocytes of exposed v.s. control animals.

These observations led to consideration of some of the effects which might not be dependent, at least directly, on a thermal response of the animal. Studies of effects in various enzymes demonstrated that at high fields (e.g. 2000-3000 V/cm, 10-200 MHz) it was possible to restrict the rotation of certain molecular bonds. This work and consideration of processes involved in lymphocyte responses (such as those leading to antibody responses which are thought to occur concurrently with the division response) suggest that various kinds of multicellular responses are possible which may still follow an  $E^2$  effect (insofar as the field inside the biological tissue) but which may be associated with the Kerr effect and may not have the same slope of a response as a thermal effect. These effects would be most likely to occur in places where molecular hydrogen bonding is not restrictive.

This establishes a model system which suggests a possible mechanism of interaction which says it is possible to have a Kerr vibrational effect on large macromolecules and perhaps even on cell division processes. With this hypothesis in mind, animals were exposed to look for effects in the brain. Measurements of mean levels of various chemicals (ions) and turnovers of some common transmitter systems showed changes in various portions of the brain.

The inactivation technique and studies of brain biochemistry were elaborated.

Dr. Frazer made the following points in conclusion:

All of this work is with very high field strengths and should be taken in that context. From this work it appears that HF band radiation at sufficiently high field strengths can produce neurotransmitter

alterations especially in the mid-brain, thalamus and cerebellum, and can induce an alteration in some divalent metals in the cerebral cortex in small rats and mice. The methodology requires improvement before conclusions can be reached on relationships between the different neurotransmitter paths and this is an area for further study. As of this point we would have to conclude that high field strength (e.g. 5000 V/m) radiations in the HF band region can produce some changes in neurotransmitters.

- o Drs. Arthur Guy and Richard Lovely, School of Medicine, University of Washington, Seattle.

Drs. Guy and Lovely discussed investigations of microwave radiation on the brain and spinal cords of cats, conduction velocities in isolated nerves (cat and frog), transmission latencies of rabbit superior ganglia, RF hearing phenomena, and behavior in rats. This work has attempted to establish dose/response curves and thresholds for observed effects. Thermocouples and thermography have been used to relate temperature change to power absorption in animals, phantom and scale models.

In the CNS studies, intact animals were exposed to 918 and 2450 MHz CW radiations. The effect on CNS mechanisms was studied using the evoked-potential method (with tactile and auditory stimuli). Amplitude and latency changes were produced in the active system by irradiation of the structures involved. Changes were not noted until levels around and above 5 watts/Kg peak absorbed power density were reached. At these levels, temperature increases (3.g., 0.2°C) in the brain start to occur which appear to be associated with the biological changes. These changes appear to increase with absorbed power density. Radiation effects were compared with the effects of non-radiation heating and radiation was combined with concurrent antagonistic cooling. Findings support the contention that the microwave effects observed were exerted through thermal loading. With pulsed energy irradiations (average deposited power 18 watts/Kg), in some of the experiments latencies increased as compared to the decreases observed with CW radiation which were associated temperature increases. Switching to CW radiation in these (pulsed) experiments resulted in decreased latencies. This cannot be explained at present. At the same time, blood pressure increases were noted with the pulsed but not CW radiation of the same average power density.

Studies of auditory phenomena associated with pulsed microwave radiation were discussed. The threshold for this phenomena appears to be independent of the peak power but rather to depend on the energy per pulse. Comparisons of responses to normal airborne acoustic stimuli and microwave pulses were given. The threshold for this phenomena is at quite low power densities and has been found to be dependent on the product of the peak power density and the pulse width such that it falls

somewhere between 10-18 milli joules/Kg. The apparent absence of cochlear microphonics in this phenomenon and a possible explanation in terms of rapid microthermal expansion, independent of absolute temperature change, were discussed.

Studies with acute exposures in isolated nerves showed changes in conduction velocity and peak amplitudes of action potentials which increase with increasing power densities which were also associated with temperature increases. When temperature was held constant with circulating cooling solution these changes were not observed. This work is continuing and has been extended to look at mechanical response to stimulation in muscle tissue.

Behavioral studies were conducted with rats exposed to 918 MHz CW radiation using two training paradigms: operant conditioning and classical conditioning. Operant conditioned animals were exposed at levels of 10, 20 and 40 mW/cm<sup>2</sup> and tested during 30 min./day sessions. No effects on performance were noted at the 2 lower levels but at 40 mW/cm<sup>2</sup> the animals' performance typically decreases starting about 5 minutes into the exposure until the animals ultimately cease performing. The next day the animals performed normally. (Following the 40 mW/cm<sup>2</sup> exposures the animals showed obvious signs of heat stress.)

More recent experiments with classically conditioned rats suggest a mild or weak aversive reaction to novel food presented prior to irradiation, when tested 24 hours later. With varying power densities this effect is not observed until power densities of approximately 25 mW/cm<sup>2</sup> are attained. The reaction typically disappears and the animals return to pre-exposure baseline performance after about 2 days. This weak reaction and rapid return to normal was noted as unusual as compared to the typically pronounced nature and persistence of this particular reaction as it is reported in the literature and seen in testing with other illness-inducing stimuli.

Dr. Guy summarized his findings and present conclusions based on work to date as follows:

With reference to his studies with CW radiation and acute (short term) exposures, latency changes were observed in the cat CNS experiments associated with tissue temperature increases at peak absorbed power densities of 5 watts/Kg (approximately equivalent to 3-10 mW/cm<sup>2</sup> average power density to the cat's head).

Changes in isolated nerve studies appeared to be dependent on heating.

In the behavioral studies a threshold for observable effects appeared to occur at 22.5 watts/Kg peak power density (spatial) (estimated 5 watts/Kg average).

The phenomenon of RF hearing appears explainable, although not necessarily proven, on the basis of rapid thermal expansion. A person with normal hearing should be able to hear these pulsed microwaves.

- o Dr. Daryl Hawkins and Dr. John Schrot, Walter Reed Army Institute of Research.

Drs. Hawkins and Schrot described investigations of behavior and lethality in rats and mice at several frequencies and various power densities in an effort to establish frequency/dose dependence for different animal species and sizes.

Rats (6) trained on a fixed ratio schedule to perform a particular task for food were used in the behavioral studies. The effect of CW microwave radiation on the animals was evaluated in terms of exposure time needed to produce work stoppage (behavioral studies) or convulsions (lethality studies). Sets of observations at each of five power levels (between 25 and 150 mW/cm<sup>2</sup>) were made at several frequencies between 700 and 3000 MHz. Animal size, frequency, and power density proved to be of major importance in producing the experimental endpoints. At all frequencies, higher power levels were more biologically effective, however this relationship was not linear. In the behavioral studies, 1700 MHz, at all power densities tested, was most effective in producing work stoppage. Although there were differences in the individual animal's responses, they all exhibited the same frequency related effects.

In the lethality studies, the frequency at which animals (in the 3 different size groups) are most vulnerable varies with the size of the animal. At the higher frequencies (2450 and 3000 MHz) there was a straightforward relationship between size and time to convulsion or death with the smaller animals being uniformly more sensitive. These relationships change with decreasing frequency. Below 1700 MHz, the smaller animals are less vulnerable as the frequency decreases while the larger animals are more sensitive so that, at the lowest frequency tested (710 MHz) the largest rats were uniformly vulnerable (showing the shortest times to convulsion). It was also found that animals' orientation with respect to the electric (E) field vector had major effects on these reactions. The animals were most vulnerable when the E field was parallel to the long axis of the body. The possible geometric relationships which may have caused the observed frequency dependence were discussed.

Dr. Hawkins summarized this work by stating that observations with each of the biological indices measured (behavior, time to convulsion, and temperature) lead them to conclude that there are very strong frequency dependent effects and that to a large extent, these effects can be explained based on temperature increases.

- o Dr. John R. Thomas, Naval Medical Research Institute, Bethesda, Maryland.

Dr. Thomas discussed studies in which complex behavioral baselines were used to assess the effects of low levels (around 10 mW/cm<sup>2</sup>) of pulsed and continuous wave microwave radiation. Rats were conditioned to respond on multiple fixed-ratio, differential-reinforcement-of-low-rate schedules (mult FR DRL). During FR schedules animals were required to respond a specific number of times to produce a food pellet and during DRL schedules a pellet was produced by responses that followed a preceding response by a specified time interval. A timeout period during which no responses were required occurred between the termination of one schedule and the beginning of the other. Several times per week the animals were exposed to microwave radiation 30 min. before an experimental session. Microwave levels of 1, 5, 10, 15 and 20 mW/cm<sup>2</sup>, employing pulsed and continuous wave S-band and pulsed X-band fields, were investigated. Generally, low rates of responding which occurred on the DRL schedule increased and high rates of responding which occurred on the FR schedule decreased as a result of microwave radiation. Low microwave levels increased responding during the timeout periods as much as 2000% of control values. Subtle changes in performance patterns were observed at microwave levels as low as 5 mW/cm<sup>2</sup>.

In summary, Dr. Thomas stated that a definite behavioral effect in conditioned rats can be obtained at the exposure levels in these experiments. He emphasized that the types of changes that occur in the behavior as a function of exposure are very critically determined by the interaction between the organism and its environment. Some behavior increases while some decreases, so the type of behavior observed is very critical. More systematic use of these techniques should result in establishing the importance of various exposure parameters (e.g. frequency, etc.) in these responses.

- o Dr. Don R. Justesen, U.S. Veterans Administration Hospital, Kansas City, Missouri.

Dr. Justesen reviewed behavioral studies with conditioned rats exposed in a multimodal cavity to 2450 MHz or sham radiation daily for 2 hours over 6 month periods to investigate the animals' ability to detect the radiation, possible suppression of conditioned behavior, and the relationship of various energy doses to observed responses. Animals were able to detect the radiation with thresholds near 500 µW/g and a dose dependent suppression of conditioned behavior was found (e.g., the frequency of responding decreased with increasing energy).

Dr. Justesen also discussed experiments based on the method of equivalent temperatures to investigate radiation effects on the

growth behavior of unicellular organisms. The method was advanced as a model system for exploring questions of thermal vs. nonthermal effects. Suspensions grown at equivalent temperatures produced by microwaves (2450 MHz) and conventional means were compared and growth differences were found.

Bacillus Sterothermophilus, at their optimal temperature for growth (60°C), were found to grow at the same rate in the log-phase in the microwave field as in a water bath, but there was earlier initiation of growth. Rates of growth at non-optimal temperatures of 50 and 70°C were also comparable, but in control suspensions, the delay before initiation of growth in log-phase was dramatically increased, the controls usually lagging behind organisms of irradiated suspensions by several hours.

Thermomyces Lanuginosa, a fungal-like organism, appears to grow at a slower rate than controls in the microwave field, over a range of temperatures (50 to 60°C) that overlaps that of optimal growth. Electronmicroscopic studies revealed a hyperproliferation of the plasma membrane which appears uniquely associated with irradiation in this organism. The effect does not appear to be greatly temperature dependent within the tested range. Aside from its slower rate of growth and the membrane hyperproliferation, the irradiated organisms appear to function normally.

In concluding comments Dr. Justesen discussed the question of power density vs energy deposition or absorption as the prime measure of nonionizing radiation. He emphasized the importance and need for measures of absorbed energy in addition to field density in these experiments--reasoning that, if there are significant nonthermal interactions (effects not due to simple heating), the best way to demonstrate or establish this is to show that some graded effect is not correlated with graded levels of energy dosing. This appears to be the case with the "Frey" effect (RF hearing), since it is the first derivative (slope of the leading edge) of the envelop of pulsed RF energy and not only the quantity of energy that is responsible for the effect. RF hearing appears to be a bona fide thermodynamic phenomenon.

- o Mr. E. L. Hunt, Batelle Pacific Northwest Laboratories, Richland, Washington.

Mr. Hunt discussed a variety of studies investigating behavioral effects of microwave irradiation (2.45 and 2.88 GHz).

Behavioral tests of general activity, swimming performance (endurance) and a vigilance task (discrimination) were used to investigate acute effects following a single 30-min exposure of adult male rats to 2.45 GHz microwaves (120 pulses/sec) in a multimodal resonating cavity. General activity was lowered in rats that received a 6.3 mW/g dose,

whether the test started promptly or 1 hr post-exposure. Swimming speed during a 5-hr test in a 6-m water alley was adversely affected in trained rats that received a 11 mW/g (near lethal) dose, but not in those that received a 6.3 mW/g dose or that received the higher dose and were tested 24 hrs. postirradiation. In the vigilance task, every 5 secs a brief sound or, infrequently, a brief light was presented and a lever response earned, respectively, a time-out punishment or a liquid reinforcement. Omission errors increased immediately post-exposure, particularly after the higher 11 mW/g irradiation, but commission errors did not increase. Behavioral changes were associated with mild to severe body heating. It was noted that the effects on the behavior of trained animals reflected alterations in performance rather than an interference with learned skills.

Studies of other endpoints (e.g. convulsions, audiogenic seizures in mice, etc) and dose/size relationships were also described. Avoidance behavior studies in rats free to move between a shielded or microwave illuminated portion of a divided cage were discussed briefly. These experiments were similar to those conducted by Dr. Frey although the frequency (2.88 GHz) was higher and some other aspects of the exposures differed. This work is still in progress and results to date are, as yet, inconclusive--a distinct aversive effect was not observed at the power density levels in Dr. Frey's experiments, but observations at higher levels suggest a possible aversion response.

In summary Dr. Hunt concluded that for the rat model for behavior there are effects produced at levels that are only mildly thermalizing. The kind of effect and how well determined or predictable it is from the level of heating depends, in part, on the kind of behavior studied. Additionally, he stressed the importance of obtaining measures of both incident and absorbed energy in these studies.

o Dr. Allan Frey of Randomline, Inc.

Dr. Frey discussed some of the many nervous system experiments he has performed, principally, behavioral studies with rats which indicated that they can in some manner "detect" microwave radiations at relatively low power density levels and studies of RF "hearing" in man, to further explore the bases or mechanisms involved in this phenomenon. His work has been primarily concerned with pulsed radiation and UHF frequencies.

A shuttle box was used to test the response of rats (detection, preference/avoidance) to the presence of low level, UHF energy (1.2 GHz). Rats were placed in a box divided by a hurdle which permits them to jump from one side of the box to the other. One side is illuminated with radiation and the other is shielded.

Pulsed radiations with various characteristics (e.g. average power density  $0.5 \text{ mW/cm}^2$ , peak  $150 \text{ mW/cm}^2$  and  $0.2 \text{ mW/cm}^2$  average,  $2.1 \text{ mW/cm}^2$  peak), CW radiation ( $2.4 \text{ mW/cm}^2$ ) and sham irradiated animals were used in these experiments. Resultant behaviors were compared, analyzing the amount of time spent by animals in the various groups in the shielded v.s. unshielded area. Animals were tested during 30-90 minute daily sessions over several days. Results showed that animals tended to avoid the pulsed radiation, spending significantly more time in the shielded portion of the box, whereas this was not the case with the CW or sham irradiations, suggesting that the animals either didn't perceive or mind the latter (CW) experience.

RF hearing studies were conducted to investigate the possibility of getting a periodicity pitch phenomenon (as occurs with acoustic stimuli) using RF "sound". This phenomenon involves a train of acoustic pulse pairs which are detected by the listener as a tone; the nature of the tone depends on the interval between pulse pairs. Using varied, pulsed microwave energy (average power density  $10 \text{ mW/cm}^2$ ) subjects were asked to match sound perceived to acoustic stimuli.

In general, subjects seemed to indicate they were perceiving the RF pulses as 5 kHz sound. This was noted as interesting since it has previously been shown that people with high frequency hearing loss (e.g. 4 kHz) or with notches in their audiograms around 5 kHz (a common region for hearing loss) can not hear RF sound. The implications of these experiments in terms of possible mechanisms for perception (or transduction) of RF sound were discussed including, for example, the possibility that RF sound transduction might be associated with outer hair cells and possibly basilar or tectoral membrane function.

In summary, Dr. Frey commented that, thus far, it appears that research into biological effects has raised more questions than it has provided definitive answers. There appear to be indications that this energy may have potential as a useful tool for exploring and advancing our understanding of the nervous system. At the present stage, the implications of this work with respect to hazards are still unclear.

o Dr. Ronald Seaman, Duke University, North Carolina

Dr. Seaman discussed the effects of microwaves on isolated neurons, based on research he conducted with Dr. Wachtel. He stated that in studying electrical activity in neurons of ganglia from Aplysia (a marine mollusc) the most consistent effect of microwaves observed is an alteration of the regular firing pattern of both "beating" and "bursting" pacemaker cells. In more than half of the pacemaker cells studied, the absorbed power level needed to produce a definite effect was less than 15 milliwatt/cc. Cells were isolated and placed in a chamber filled with sea water and exposed in a microwave strip line. The effects of pulsed versus continuous microwaves of the same average

power were not distinguishable (nor were the effects at 1.5 GHz versus 2.45 GHz). In most experiments where convective heating was used in control preparations, it was found that the microwave effects were more or less reproducible by ganglionic warming. In some cases, however, the firing pattern changes in some neurons resulting from microwave irradiation were definitely not "thermally reproducible." A consideration of the current densities needed leads to speculation that firing pattern changes not ascribable to warming could be attributed to polarizing currents produced by microwave rectification.

In summary Dr. Seaman concluded that single cell recordings can be made during irradiation, with little or no artifacts, using the strip line technique. This technique also has the advantage permitting fairly good calculations of absorbed power. As far as neurons are concerned, it appears that there are neurons sensitive to very low levels of microwave radiation, probably due mostly to their high temperature sensitivity; although some of the responses observed could not be reproduced with heating in these experiments. Dr. Seaman speculated that once the responses are catalogued for single neurons in one system, it may be possible to extrapolate, using absorbed power as a normalizing factor, to other nervous systems. Further study of pulsed radiation (v.s. CW) seems in order, since most of the responses which could not be explained by thermal considerations occurred under pulsed irradiation.

- o Dr. Mark DeSantis, Georgetown University, Washington, D.C.

Dr. DeSantis discussed experiments conducted with Dr. Ernest Albert of George Washington University, designed to evaluate microwave effects in the central nervous system (CNS) using light and transmission electron microscopy.

Chinese hamsters were irradiated with continuous wave (CW) microwaves (1700, 2450 or 3,000 MHz) at 50, 25 or 10 mW/cm<sup>2</sup>. Most exposures were acute, for 30, 60 or 120 minutes, although a few animals were exposed over several days for up to three weeks. Immediately after the last exposure or following a prescribed recovery period the animals were anesthetized and perfused. Central nervous system tissue from control and experimental animals were simultaneously processed either for light or electron microscopy. At all power densities changes were observed in CNS neurons with 1700 and 2450 MHz but, so far, not with 3,000 MHz exposures. The effects appear to be reversible in acutely exposed animals allowed a 10-14 day recovery period following exposure. Only certain areas of the CNS show vacuolation and tigrolysis of neuron cell bodies after exposure to microwaves. Hypothalamic and subthalamic neurons of the cerebellum, spinal cord motor neurons, and trigeminal mesencephalic nucleus

neurons did not. Electron microscopy revealed a decrease in the rough endoplasmic reticulum and ribosomes of hypothalamic neuron cell bodies. Tests for disruption of the integrity of the blood-brain barrier have given negative results so far.

In summary, Dr. DeSantis stated that there are detectable changes in certain CNS neurons of animals exposed to some of the parameters of microwave radiation tested. However, the reasons for these changes cannot be unequivocally explained at this time. He noted that temperature measurements were not made in these animals and that more experiments with chronic exposures are needed.

Summary:

In addition to discussion and suggestions regarding specific research presented and, more broadly, the approaches these investigations represent (e.g. isolated neuron, nerve, EEG studies, behavioral and biochemical assays), the following summary includes observations and recommendations pertaining to this area of research and the program in general, made during, and in writing following, the work session and, particularly, in the concluding discussion period.

1. There was general agreement that the session was of considerable value in providing Council members, OTP and other attendees with an up-to-date picture of the status of knowledge, research and major trends in this area. It was particularly useful to see representative projects in a given area juxtaposed, with opportunity for interaction and exchange among investigators and other participants. This permitted a more coherent view of the status and major "themes" and/or questions which have emerged. Additionally, the exchange among investigators and others, particularly the neuroscience specialists from outside the MW field, resulted in useful recommendations and suggested future directions relative to some of the individual investigations.
2. Overall, it was clear that there has been very real progress over the past 2-3 years as evidenced by the emergence of better defined trends and questions, with a "clustering" of work around some common themes. This, as compared with the more dispersed scatter of a wide variety of unrelated studies which characterized early efforts. In several instances similar studies are being undertaken in two or more independent laboratories to confirm observations (e.g. RF-hearing, certain behavioral studies). It was noted that a considerable amount of material (and thinking) is beginning to crystallize with a degree of commonality, particularly with regard to biochemical, endocrine and neuro-endocrine effects. Although there is a great deal more commonality and interrelatable research, there is still a need to accentuate complementary efforts and to build up activities with a greater "critical mass" as some tendency for an excessive fragmentation (numerous disconnected, subcritical efforts) remains. This should,

of course, not preclude new or innovative approaches. Although lab-to-lab and investigator-to-investigator communications have improved significantly, there is still a need to improve liaison and communication, particularly among sponsoring agencies.

3. There is some very good work underway in the neural/behavioral area and a reasonable diversity of approaches. Efforts to date have raised a number of questions which can serve to focus continuing activities to resolve these matters. Much of this work is still in process, some of the findings are still based on small numbers of experiments or subjects and there are areas of uncertainty in some aspects of the dosimetry. There are, nonetheless, substantive indications of effects in the nervous system and behavior at this stage, warranting further investigation. The mechanisms, specific exposure conditions and health implications are not yet sufficiently understood or explainable, and considerably more research will be required.

4. Considerable progress has been made in characterizing exposures, procedures for experimenting within EM fields and dosimetry in general. The level of sophistication and awareness of complexities in this area has improved markedly, although difficulties remain in determining doses and distributions of absorbed energy, etc. The importance of characterizing both power densities and absorbed energy in a uniform and reproducible manner in these experiments was emphasized by the discussants. The desirability of publishing measurement guidelines, including relating incident field densities to absorbed power was pointed out. It was indicated that such an effort is in progress.

5. Some general comments included: discussion of the increasing number of claims for compensation and awards in cases alleging injury due to RF/microwave exposure which cannot now be adjudicated and their implications in terms of cost and priorities; recent progress in establishing international discourse and cooperation; and the desirability of continuing and improving the exchange of information.

6. With regard to research in this area, it was noted that in some studies effects (on performance) were observable only during irradiation while in others, similar effects were observed following exposure--a hypothesis as to possible mechanisms which could account for this was suggested.

7. With the phenomenon of RF hearing in mind, it was suggested that caution be exercised in behavioral studies suggesting detection, perception or cueing of animals by RF to determine whether or not RF "hearing" is involved or responsible.

8. Several studies indicated a greater or different biological effect of pulsed as compared with CW radiation--which, in one case, was greatest

with modulations in the range of natural bioelectric rhythms. This should be investigated further together with associated neurochemical and mechanism studies.

9. While not strictly within the area being reviewed, the lymphocyte responses discussed in the course of this session and associated immunology (antigen-antibody responses) warrant further study.

10. As a related matter, the use of RF as a tool for advancing our knowledge of brain function and possibly for microwave imaging systems for experimental and medical use was noted as potentially valuable fallout from this research.

11. Work to date has pointed up a number of common areas requiring more emphasis in continuing studies:

- o long-term (chronic) exposures--of at least several months to a year's duration.
- o separation of effects of electric (E) and magnetic (H) fields.
- o modulated/pulsed radiations--and comparative studies of different modulations and waveforms, e.g., CW radiations vs. pulsed -- also effects of multi-frequency exposures.
- o more parallel effort to investigate mechanisms involved in any effects observed.
- o more work at the biophysical, membrane and neurochemical levels.
- o dosimetry, field measurements, and energy distributions to permit determination of fields and scattering within subjects and extrapolation from one animal to another and to man.

12. While funding levels were not an explicit subject of discussion, it was clear that the levels (and continuity) of support for this research are still inadequate. This slows progress considerably and is apparent in the lack of available manpower, and support facilities in these studies. Multi-year funding is particularly important for the conduct of chronic exposures and long-term studies, to establish programs of a reasonable critical mass, for attracting additional investigators into what is not an established field of research, and even to improving liaison between investigators and research activities, including travel to each other's laboratories, etc.

OFFICE OF TELECOMMUNICATIONS POLICY  
EXECUTIVE OFFICE OF THE PRESIDENT  
WASHINGTON, D.C. 20504

October 18, 1974

ELECTROMAGNETIC RADIATION MANAGEMENT  
ADVISORY COUNCIL

AGENDA

XX

OCTOBER 31ST AND NOVEMBER 1, 1974  
1800 G STREET, N.W.  
ROOM 730 - 8:30 AM

XX

WORK SESSION ON NERVOUS SYSTEM AND BEHAVIORAL  
EFFECTS OF NONIONIZING EM RADIATION

THURSDAY OCTOBER 31, 1974

I. MORNING - 8:30 AM

Agency Program Association

Dr. Donald Galloway  
Food & Drug Administration, PHS  
Bureau of Radiological Health

BRH

Dr. Susan M. Bawin  
Brain Research Institute  
UCLA

BRH and Navy

Drs. Fraser/Stavinoha\*/Mitchell  
USAF School of Aerospace Medicine  
Brooks Air Force Base (\*University  
of Texas)

Air Force

Dr. Arthur Guy/Dr. Richard Lovely  
School of Medicine  
University of Washington

BRH and Navy

II. AFTERNOON - 1:00 PM

Dr. T. Daryl Hawkins/Dr. John Schrot  
Walter Reed Army Institute for Research

Army

Dr. John Thomas  
Naval Medical Research Institute

Navy

Dr. Donald Justesen  
Laboratory of Experimental Neuropsychology  
U.S. Veterans Administration Hospital  
Kansas City, Missouri

BRH

Mr. Edward L. Hunt  
Battelle Pacific NW Laboratories

## Navy

XVX

FRIDAY NOVEMBER 1, 1974

## I. MORNING

Dr. Allan Frey  
Randomline Inc.

Navy

Mr. Ronald Seaman  
Duke University

Navy

Dr. Mark De Santis  
Georgetown University

BRH/Navy

## II. AFTERNOON

## Discussion

Council members and other invited participants are noted in the attachment.

# ERMAL MEMBERS

1. Dr. W. Ross Adey  
Professor, Anatomy and Physiology  
University of California, Los Angeles  
Director Space Biological Laboratory, Brain Research Institute
2. Professor Merrill Eisenbud  
Professor and Director, Laboratory for  
Environmental Studies, Institute of  
Environmental Medicine, New York  
University Medical Center
3. Harold Gauper, Jr.  
Manager, Electrical Interference and Transients  
Program, Research and Development Center  
General Electric Company, Schenectady, New York
4. Dr. William Taylor Ham, Jr.  
Professor and Chairman Department of Biophysics  
Virginia Commonwealth University
5. H. Janet Healer  
Consultant, Bioscience Programs  
Dover, Massachusetts
6. Dr. Samuel Koslov, Special Assistant  
Office of Assistant Secretary of Navy  
The Pentagon
7. William Waldon Mumford, Engineering Consultant  
Morris Plains, New Jersey
8. Dr. Herbert Pollack  
Professor Emeritus of Clinical Medicine  
George Washington University  
Washington, D.C.  
Consultant, Institute for Defense Analysis

LIST OF ATTENDEES

<u>NAME</u>	<u>REPRESENTING</u>
R. Adey	UCLA/ERMAC
Suzanne M. Bawin	UCLA - Neurobiology
Marlet H. Benedick	ITT Research Institute
D. C. Brown	OTP
Bob Butenhoff	USAEC (ERDA)
Robert E. Carter	AFRRI
Mark DeSantis	Dr. E. Albert, G.W. Univ.
W. Dean, Jr.	OTP
LTC Ed Dodd	US Army/OTSG
Donald N. Farrer	USAFSAM, Brooks AFB, Texas
Allan Frey	Randomline, Inc.
Fred J. Friel, Jr.	NASA - Freq. Mgr.
Michael Gage	EPA, NERC, RTP, N.C. (Exp Biol Lab)
Robert Galambos	Univ. Cal., San Diego
Don Galloway	FDA
Harold A. Gauper, Jr.	General Electric/ERMAC
Arthur W. Guy	Univ. of Washington
William T. Ham, Jr.	Medical College of Va./ERMAC
T. Daryl Hawkins	Army - Walter Reed
DeWitt Hazzard	FDA - BRH
J. Healer	OTP/ERMAC
Louis N. Heynick	Stanford Research Institute
Susan Hockfield	George Washington University
Ed Hunt	Battelle - Navy
Dave Janes	EPA
Don R. Justesen	BRH - US Veterans Admin.
S. Koslov	OASN-R&D/ERMAC
A. Kranich	Science Trends
George S. Kush	USAF Surgeon Generals Office
David Lee	U.S. Dept. of Labor - OSHA
Donald B. Lindsley	UCLA
Richard H. Lovely	University of Washington
Donald I. McRee	NIEHS
Don Mennie	IEEE SPECTRUM
John C. Mitchell	USAF School of Aerospace Medicine
William Mumford	ERMAC
Don Myers	CIA
Herbert Pollack	George Washington Univ./ERMAC
Peter Polson	Stanford Research Institute
Elliot Postow	Navy Medical R&D Command
James Rabinowitz	N.Y.U. Medical Center
Lawrence Reiter	EPA, RTP, N.C.
Julius Ross	USIA - VOA
Tom Rozzell	ONR
John A. Santolucito	EPA, RTP, N.C. (Exp Biol Lab)

NAME

Ron Seaman  
John Schrot  
Moris L. Shore  
Charlotte Silverman  
William B. Stavinocha  
John R. Thomas  
Paul A. Tyler  
Paul F. Wacker  
James M. Wyckoff

REPRESENTING

Duke University (Navy)  
Army - WRAIR  
BRH - FDA  
BRH - FDA  
Univ. of Texas - San Antonio, Tex.  
Navy  
Navy  
National Bureau of Standards, Boulder  
DOC/NBS

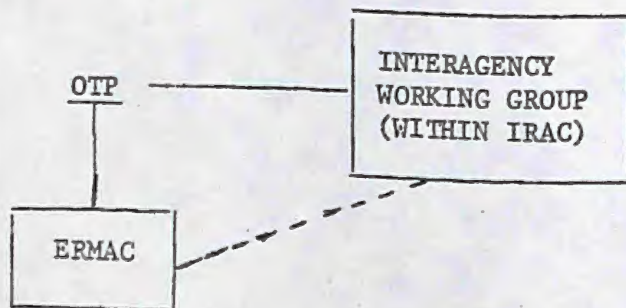
INVITED SPECIALIST PARTICIPANTS

Dr. Donald B. Lindsley  
Department of Psychology  
UCLA, Los Angeles, Cal. 90024

Dr. Robert Galambos  
Department of Neurosciences  
University of California  
La Jolla, California 92037

F

FIGURE 5. PARTICIPANTS



AGRICULTURE

AEC

CIA\*

COMMERCE/NBS\*

DEFENSE\*

ARMY

NAVY

AIR FORCE

DEFENSE NUCLEAR AGENCY/AFRRI

EPA\*

TRANSPORTATION/FAA\*

FCC

HEW\*

FDA/BUREAU OF RADIOLOGICAL HEALTH (BR)

NATIONAL INSTITUTE OF ENVIRONMENTAL

HEALTH SAFETY (NIEHS)

NATIONAL INSTITUTE OF OCCUPATIONAL

SAFETY AND HEALTH (NIOSH)

INTERIOR

LABOR

NASA

NSF\*

USIA

VA\*

\* Active programs

V. STRUCTURE : AGENCY ROLES

Structurally, this is a multiagency program in which research and funding responsibilities are shared. This is necessary since the problem is not exclusively within the domain of any one agency. Many agencies whose operations involve the use of RF energy or who may be affected by its use have been and are currently conducting research appropriate to their own responsibilities and missions. In aggregate, however, the effort has been fragmented and current economy measures together with competition for priorities and dollars within agencies could perpetuate and exacerbate this situation. In the new program participating agencies roles are based on their particular responsibilities and special capabilities which are coordinated to eliminate fragmentation and maximize the application of resources in eliminating question marks which today exist in this field.

The OTP is responsible for coordinating the overall program and for the elimination of unintended duplication and voids in the effort. The ERMAC advises and assists OTP. For coordination within the Government an interagency working group (Side Effects Working Group) was formed. Comprised of agency representatives, this group has been meeting monthly since April this year and is part of the Interdepartment Radio Advisory Committee (IRAC) which advises OTP on the use of radio within the Federal Government.

The agencies' roles are broadly outlined. Each develops the elements and specifics of its own program and controls the administration of funds recommended. The major participants are HEW, EPA and DOD which together will account for approximately 80% of the effort.

As an example, in the plan HEW is responsible for a major biological research program including controlled animal experimentation, basic mechanism studies and effects on people. Emphasis is on long-term exposures involved in situations pertaining to public health and safety, assessing hazards relating to the general public and to industry, occupational uses and exposures, and, of course, nonionizing radiation from electronic products.

EPA is concerned with assessing and determining control mechanisms necessary for nonionizing radiations in the environment. Involved are biological effects research, environmental surveillance including supporting data banks, and the capability to provide review and analysis as to nonionizing electromagnetic aspects of environmental impact statements.

The Defense Department ensures that the research programs of the three military departments are coordinated in detail and complementary with the programs of other agencies. Electronics systems under DOD management (e.g., SANGUINE, SAFEGUARD, Shipboard, Air Traffic Control, Field Radars, Air Defense Command Systems, etc.) will be assessed.

The Army effort emphasizes research particularly related to specific frequency ranges, device characteristics and operational environments of their personnel. The Navy and Air Force activities are oriented similarly.

The Department of Commerce is responsible for developing new methods of instrumentation, dosimetric methodologies, and standardization of measurement devices.

The National Science Foundation's role is to encourage and support activities to fill the void of knowledge of basic mechanisms involved in EMR interactions with biological systems.

Similarly, other agencies--involved in the use and management of the radio spectrum--have responsibilities coincident with their basic missions:

The Federal Communications Commission, which licenses all non-Government use of the spectrum, is concerned with associated exposures and safety.

The Federal Aviation Administration is concerned with exposures of passengers, employees and the public in flight and airport environs.

The U. S. Information Agency operates very high powered HF band communication systems.

The Department of Agriculture operates a forest service communications network and is concerned with effects on crops and livestock.

The National Aeronautics and Space Administration operates extremely high powered tracking stations and is responsible for EMR effects in space environments.

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FIGURE 4. EMR/BIOEFFECTS PROGRAM - 1974  
(Summary Data)

PROGRAM AREAS (See Figure 1 & Key Below)

AGENCY	#PRO-JECTS	I/O = Inhouse /Out	1 G/H/D	2 NS	3 BEHAV/ PSYCH	4 GROSS COND	5 EPIDEM	6 CLIN EXAM	7 MECH	8A EYE	8B C-V	8C MET/END/ BIOCHEM	8D T/T.REG	8E CYT/HIST/ MORPH	8F OTHER	9 INST	10 ABSORP	11 ENVIR/ SAFETY	12 SPECIAL FEATURE
DOD	(66) total	I=24 (O=42) total	(12-3,9) 1J	(13-2,11) 1J	(13-4,9)	(7-0,7)	(2-0,2)	(4-0,4)	(9-0,9)	(6-3,3) 2J	(1-0,1)	(18-1,17) 2J	(6-0,6)	(5-1,4) 1J	(11-0,11)	(9-3,6)	(9-5,4)	(5-0,5)	(9-2,7)
Army	15 (1w/BRH)	I=7 O=8	3-0,3 (1J)	2-0,2	1-0,1	-	1-0,1 (1J)	1-0,1	3-0,3	2-1,1	-	3-0,3	3-0,3	2-0,2	2-0,2	1-1,0	2-2,0	-	4-2,2
Navy	39 (3w/BRH)	I=13 O=26	5-3,2	10-2,8 (1J)	12-4,8	5-0,5	-	3-0,3	5-0,5 (1J)	4-2,2 (2J)	1-0,1	12-1,11 (2J)	1-0,1	1-1,0 (1J)	7-0,7	3-0,3	3-1,2	1-0,1	4-0,4
AF	10	I=3 O=7	3-0,3	1-0,1	-	-	-	-	1-0,1	-	-	3-0,3	2-0,2	2-0,2	1-0,1	5-2,3	4-2,2	3-0,3	1-0,1
DNA	2	I=1 O=1	1-0,1	-	-	2-0,2	1-0,1	-	-	-	-	-	-	-	1-0,1	-	-	1-0,1	-
HEW	(30) total	I=20 (O=10) total	(10-6,4) 1J	(5-0,5) 1J	(2-1,1)	-	(1-0,1) 1J	-	(5-0,5) 1J	(3-1,2) 2J	-	(4-1,3) 2J	(1-0,1)	(3-1,2) 1J	-	(5-2,3)	(4-1,3)	(3-1,2)	(3-1,2)
BRH	23 (4w/DOD)	I=15 O=8	8-4,4 (1J)	3-0,3 (1J)	2-1,1	-	1-0,1 (1J)	-	3-0,3 (1J)	3-1,2 (2J)	-	4-1,3 (2J)	1-0,1	3-1,2 (1J)	-	3-1,2	3-1,2	2-0,2	3-1,
NIEHS	5	I=4 O=1	2-2,0	2-0,2	-	-	-	-	2-0,2	-	-	-	-	-	-	1-0,1	1-0,1	-	-
NIOSH	3	I=1 O=2	-	-	-	-	-	-	-	-	-	-	-	-	-	2-2,0	-	1-1,0	-
EPA	12	I=11 O=1	3-1,2	2-0,2	1-0,1	-	1-1,0	-	4-0,4	-	-	4-0,4	-	1-0,1	2-0,2	3-0,3	-	3-0,3	1-0,1
DOC-NBS	1 + 8T	I=1+8T	-	-	-	-	-	-	-	-	-	-	-	-	-	6-6,0 (5T)	1-1,0 (1T)	1-1,0 (1T)	-
NSF	3	O=3	2-1,1	-	-	-	-	-	1-0,1	-	1-0,1	-	-	1-0,1	-	-	1-0,1	-	-
FCC	1	I=1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1-1,0	-
FAA	1	O=1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1-1,0	-
CIA	1	O=1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1-1,0
VA	2	I=2	-	-	1-0,1	-	-	-	-	1-0,1	-	-	-	-	-	1-0,1	1-0,1	-	-
TOTALS*	114	I=59 O=55**	24	29	17	7	3	4	18	8	2	24	7	9	13	20	15	13	14

KEY

Example: DOD has a total of (66) projects; 24 are being conducted within DOD and 42 by outside contracts, grants, or another agency.

In program area no. 1, G/H/D (defined in Fig. 1) there are 12 relevant projects:

• 3 of the 12 are concerned only with program area no. 1,

• 9 of the 12 are concerned with program area no. 1, and other program areas as well.

One of the projects (1J) is jointly funded with another agency.

T - indicates a project funded by transfer dollars from another agency. (8T) indicates 8 transfer fund projects.

J - indicates a project jointly funded with another agency.

\* Totals are adjusted to account for joint and transfer funding.

\*\* In-Government = 67; non-Government = 47.

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### BRH Designated WHO Collaborating Centre for Non-Ionizing Radiation

The Bureau of Radiological Health has been designated as the World Health Organization (WHO) Collaborating Centre for Standardization of Protection Against Non-Ionizing Radiation and, concurrently, Bureau Director John C. Villforth has been appointed Principal Investigator and Head of the Centre. The designation, which is for a 3-year period, was made by the WHO Director General with the concurrence of Assistant Secretary for Health Charles C. Edwards.

For purposes of the WHO Collaborating Centre, the term "nonionizing" radiation refers to all types of electromagnetic radiation-- particularly microwave, infrared, ultraviolet, and laser. Ultrasound also is included in the definition.

Among other functions, the Centre is to assist WHO in (1) estimating present levels and trends of human exposure from nonionizing radiation, (2) promoting the establishment of instrument calibration and reference services in various countries, (3) establishing internationally acceptable nomenclature, definition of terms and quantities, and dosimetry methods, (4) training public health personnel, (5) alerting health officials to the need for establishing nonionizing radiation control programs, and (6) stimulating international research on biological effects and development of measuring instrumentation.

In commenting on the Bureau's new assignment, Mr. Villforth said he believes the WHO Collaborating Centre for Non-Ionizing Radiation will greatly aid in the exchange of scientific information, particularly radiation biology criteria, between the United States and other countries.

According to the WHO manual for medical research programs, designation of collaborating centres is based on a particular institution having "the necessary expertise and facilities to fulfill a specific function or range of functions related to the WHO research program." In addition, the manual states, the institution must be able to "maintain high technical standards over a long period."