Grimes

TFT TIME & FREQUENCY TECHNOLOGY INC.

May 22, 1980

Mr. Harold Denton
Director of the Office of
Nuclear Regulation
Nuclear Regulartory Commission
Washington, DC 20555

Dear Mr. Denton:

This letter is written as a result of our company's continuing development of Emergency Broadcast Systems for the Broadcast Industry, School Administrations, and now the Nuclear Regulations Commissions's proposed emergency evacuation plan for utility companies with Nuclear plants.

TFT Inc. has been manufacturing EBS equipment since the FCC mandated the two tone system in April of 1976, and have become the leader in supplying this equipment to broadcasters throughout the United States.

We have also developed School Alert systems and now an E-Alert warning receiver based upon this two tone system.

We feel that the most effective way to alert people is to utilize the existing EBS system in conjunction with local Civilian Defense Agencies and State Emergency Management Agencies.

I am enclosing a copy of an article by our President outlining our beliefs as well as literature explaining our EBS Systems for your review.

If I can be of any further service please do not hesitate to contact me at my office.

Very truly yours,

Tom Creighton

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Enclosures

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There Is A Highly Efficient Local Warning System All Ready For The Nuclear Operator

The Emergency Broadcast System (EBS) has proved itself in more than one thousand activations across the country, helping hundreds of communities handle tornadoes, hurricanes, floods, tank-car explosions, power failures, blizzards, civil disturbances, etc. EBS could meet all the requirements for a nuclear power plant warning system and gain good will from the public.

By Joseph Wu
President
Time & Frequency Technology, Inc.
Santa Clara, California

MAIN CHARACTERISTICS OF THE TFT

E-ALERT EMERGENCY WARNING RECEIVER

Frequency Range...AM - 525 KHz-1650 KHz
FM - 88 MHz--108 MHz

Sensitivity.....AM - 700 uv/M
FM - 30 uv

Antenna.....AM - Built-In Ferrite
FM - whip ant. & 300 ohm

IF.....AM - 455 KHz
FM - 10.7 MHz

Audio Power Output.....500 MW

Tuning Stability...Crystal Controlled

Number of Channels.....One or Two (automatic scan)

Warning Indicators.....Audible Tones and LED

Volume Control...Minimum Volume Level

Power Source...UL Approved AC Adaptor or 9V Internal Battery

Size.....7-3/4" x 4½" x 2-7/8"

Weight.....1 Lb. 6 Oz.

Cabinet.....Woodgrained High-Impact Plastic

Before the technology allows us to build an accident-proof nuclear power plant, a fast-alert system that would allow the operator of a nuclear plant to inform inhabitants of the area around the plant of an emergency is of great interest today. This effort is centered at the present time in a proposal by the Nuclear Regulatory Commission that every operator of a nuclear plant be required to have an effective state and local emergency response plan. Establishing communications with the people living within a ten-mile radius of the plant is one of the key issues of an emergency response plan.

The NRC has been getting comments from the industry and from other interested persons and groups on this proposal. The movement of the proposal to the status of a rule had not been definitively clear when this was written. One important part of the proposal is that the NRC, so far, is not going to specify what system the nuclear operator uses. The proposal as it stands would allow the operator to use any system that meets the requirements as finally established.

However, the plant operator, under the proposal, would be required to get the cooperation and approval of the relevant local and state authorities. This points in the direction of a system in which local and state officials and disaster organizations in many states are already deeply involved. It is a system that seems to offer everything the NRC proposal required and to have important advantages for the nuclear operator besides. It is the Emergency Boradcast System (EBS), about four years old in its present form and one of the great successes of joint industry-government community action.

Before describing the EBS in detail, we should look at various possible systems for satisfying the requirement. A siren system is, of course, the traditional warning apparatus and came into its own when air raids on populated centers developed as a major element of warfare. The point here is that when the sirens went off, every listener knew what to do - head for the assigned air-raid shelter. It is easy, in fact, to devise a two-message siren system

that tells the listeners either to go to the shelter (a raid is coming) or to come out (the raid is over).

But the instructions to the people within range of a nuclear accident are likely to be far more complex. Moreover, it is most important that they hear a person with the instructions who can warn or reassure as the situation may require. It would be manifestly dangerous to depend solely on a siren system for warning people near a nuclear plant of an accident. The result could be the production of confusion leading to panic. Should we stay? Should we leave? If we leave, where should we go?

The point is completely obvious. A warning of a nuclear accident must include complete, authoritative instructions as to what persons in each area around the plant are to do. A siren system cannot come near delivering messages of this complexity.

The telephone is also clearly useless because it cannot reach everyone in an urban area rapidly. Radio and television broadcasting look attractive because they can cover the whole area at one time.

But there is one element lacking in normal broadcasting. It is a means for telling persons at receiving locations, who may not be tuned in to the radio at the right time, that a warning message is coming. The nuclear alerting system cannot take the chance that everyone is listening to the

right station at the right time. The system must by an operation at the sending end attract listeners and then deliver to them the message.

The EBS carries out exactly those functions, and its success as an aid to community handling of emergencies has been phenomenal. EBS grew out of an earlier system, Conelrad, set up after World War II to make sure that boradcasters would take regular programming off the air and let a few stations broadcast emergency warnings. Conelrad was based on a special receiver installed in broadcast stations that could be triggered from central control points to tell each station an emergency message was about to go out. Each station would have an assignment to proceed in a certain way when the warning came in.

The Conelrad receiver was triggered by a special tone sent out, and carrier signal interrupted in a special pattern. This tone, if correctly interpreted by the receivers automatic circuits, would turn the receiver on and make it ready to bring in the warning message.

Conelrad did not get the full support of the broadcast industry in large part because the receiver tended to be triggered by false signals. Many broadcast operating staffs simply turned the troublesome receiver off, thus preventing the station from playing any role in the emergency system.

After long study and consultation between the government and the industry, a new system went into use in April, 1976. This system uses a triggering

signal consisting of two tones sent simultaneously at precise frequencies of 853 Hz and 960 Hz. The receiver triggers only if both signals come in, and they must be on the assigned frequencies within ±3 cycles or approximately ±0.3%. This close tolerance had become practical with the development of inexpensive frequency-sensitive elements with the necessary precision of response.

The new two-tone system became mandatory for U.S. broadcasters on April 15, 1976. Each station was required to install an encoder and receiver/decoder embodying the new system. The country was divided into service areas (about 550), in each of which one station acted as the Common Program Control Station (CPCS), and took the responsibility for getting all the stations in the area lined up into the net to handle an emergency message.

The CPCS gets the alert signal from a state-wide control station or by telephone, wire service, or radio channel in a pre-arranged manner. When the alert comes, the operator on duty at the CPCS pushes the alert button on the EBS encoder. This automatically interrupts the program in progress and sends out the two-tone signal on the stations regular carrier.

The other stations in the area all have their EBS receivers permanently tuned to the CPCS frequency. The receivers are always powered, but are muted until the two-tone signal comes in. This automatically demutes every receiver

and puts it in operating mode to receive the emergency message.

The operators in the receiving stations are required to push their encoder buttons as soon as an alert comes in. This interrupts the on-going program in each case and alerts listeners to the fact that an emergency message will be broadcast within seconds or minutes. This part of the operation has basic significance for operators of nuclear plants as will be described in detail in a moment.

The two-tone EBS has been a technical success in contrast with the older one-tone Conelrad system, and has been accepted almost universally by the broadcasting industry. In the periodic tests of the system now carried out, it has become clear that the whole country can be reached in a very short time if a national emergency makes that necessary. Active participation is voluntary; something like 95% of all broadcast stations have chosen to be active in the program, which means that they keep the EBS equipment in working order at all times, and train operating personnel to react to an alert immediately and carry out the detailed Federal Communications Commission instructions for each part of the process.

At this writing, the EBS has never been called up for a national emergency, but it has proven to have immense value to the country nevertheless. Early in the development of the system the idea grew that particular states, regions, or even single cities could make use of the EBS in that one

area to alert and instruct citizens in local emergencies of every kind. Under the leadership of the FCC and other government agencies, local organizations have been set up in more than half of the 550 regions of the country to make local alerts practical, and new local nets are being set up rapidly as this is written.

The organization of a local net includes the assignment of responsibility to local government officials for activating the net, and the establishment of reliable and rapid communication between those officials and the relevant broadcast stations in the area. This organizing of the net must be carried out by local initiative, and requires total support from all relevant local agencies - city and state officials, the Civil Defense organization, etc.

It also requires total support from the broadcasters in the area, and this has been forthcoming almost without fail in every part of the country. The FCC has developed a Model Plan for a local EBS net which allows for alteration to meet local conditions, whatever they may be.

In the last three years, as the local nets have spread across the country, their value has been overwhelmingly established by their use in more than one thousand alerts. Nor is the system being used frivolously; the local agencies all take their responsibilities with the greatest seriousness.

A large proportion of the alerts have been for weather emergencies of every kind: crippling snow storms, hurricanes, tornados, severe thunderstorms, etc. A number of other kinds of emergency in which local EBS nets helped tremendously have been power failures, tank-car explosions, floods, dangerous air pollution, civil disorder. For example, a state-wide power failure in Virginia in March, 1977, led the Governor to make heavy use of the state-wide EBS net. He credits this instant communication with the whole state, continued throughout the emergency, with greatly reducing the confusion and loss that the power failure threatened to cause.

As the local EBS nets have won powerful positions in the communities in which they operate, an extension of the system is developing that has the highest importance for the operator of a nuclear plant. The FCC and other concerned agencies are now encouraging the use of the special alerting receivers not only in the broadcast stations of the net but also in schools, factories, hospitals, businesses, and in homes. The value of this is clear. If an organization or an individual is listening to the radio, to any local station, when an alert goes out, the emergency message will, of course, reach that organization or individual when it is broadcast. But if the organization or individual happens not to have the radio on at the time of the alert, it may take them quite a while to learn of the message, or they may miss it entirely.

With an EBS alerting receiver in a central place in the organization or home, the chances that the message will be heard immediately are greatly improved, probably reaching greater than 95%. No one at the receiving end has to turn on the receiver - that is done by the broadcast stations with activation of the EBS encoder. The operator at the broadcast station in effect reaches out throughout the community and turns on all the EBS-alert receivers in the area. In each office, factory, school, and home the two tones are projected from the loudspeaker and tell people within a considerable range of the receiver that an emergency message is coming. They immediately drop competing activities and pay attention to the EBS alert receiver. Any other radio receivers in the house that happen to be tuned to the EBS station will also, of course, bring in the alerting tones and the message.

The obvious need is for an inexpensive EBS alerting receiver. My company has made a sizeable proportion of all the EBS encoders and receivers installed by broadcast stations to meet the April, 1976 deadline, and in new stations thereafter. We have recently adapted the technology developed for that broadcast equipment to a small, receive-only unit designed specifically for schools, homes, businesses, etc. It has ample sensitivity to cover the ten-mile range specified by the FCC. It has crystal controlled oscillator circuits that are totally reliable in responding to the EBS broadcast stations.

To provide high reliability, this receiver can be tuned permanently to two local stations at the same time. If a two-tone EBS signal comes from either one, the receiver locks to that station and brings in all broadcasts that follow during the alert.

If a nuclear operator decided to use the local EBS for his warning system, he would first establish firm understanding and lines of communication with the local officials in charge of activating the net. And the nuclear operator might want to assist in some way the distribution of alerting receivers in the community. Their cost will be small: our receiver, for example, may be sold in the $30-$50 range, depending on quantity.

By choosing a position in the EBS net, the nuclear operator would get a tremendous leverage from the communities respect for the EBS operation. He would connect with an organization and facilities already in place to do exactly the job he wants to do. If he aided expansion of the operation in any way, he would win local gratitude: a person or organization getting one of the alert receivers, for example, is much more effectively connected to EBS, not only for nuclear warnings but also for every kind of emergency alert.

The nuclear operator would benefit from the extremely strong "community spirit" which most of the local net organizations have developed. In most places those in charge of the local nets are very proud of what they are doing and convinced of its value to the community. They tend to go beyond the FCC's minumum requirements. In Connecticut, to take just one example

from many, the state EBS organization runs periodic "live" tests of the system, separate from those prescribed by the FCC, to give every broadcast operator practice in doing the right thing when an alert comes in. They get together after the tests to discuss problems that come up and decide what to do about them.

In those areas in which a local EBS net has not yet been organized, the nuclear operator might well want to join with local state and city officials and important broadcast managements in getting the net set up. This also would have very positive effects on community attitudes. As already noted, the FCC is ready with model plans for the local EBS net, and can dispatch personnel expert in the subject to the local deliberations if they are wanted. Broadcast station managements are almost universally ready and eager to move on this; their support will be strong, and in most cases it takes only a push on local officialdom to get the thing going.

In sum, the EBS has become a nearly ideal fast warning system for any kind of emergencies, local, state, or regional. Nuclear emergencies are prime examples of the kind of thing EBS handles effectively. The nuclear operators will not only provide a public service to the committee but also will gain good will from the public by using the EBS.