DESCRIPTION OF THE EARLY WARNING SYSTEM FOR THE WASHINGTON PUBLIC POWER SUPPLY SYSTEM NUCLEAR PLANTS 1 AND 2

Revision 2

January, 1985

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I. INTRODUCTION

This document describes the Early Warning System for the Washington Public Power Supply System's Nuclear Plants 1 and 2 Ten-Mile Emergency Planning Zone. The Early Warning System will be utilized as described in the Washington Public Power Supply System's WNP-1 and 2 Emergency Preparedness Plan.

The early warning system is based on a study performed by the Supply System using the CRAC II computer code and probabalistic analysis methods to assess the risk and benefit. The study is titled, "Assessment of Emergency Early Warning at Washington Public Power Supply System Hanford Site", and is dated October 1982.(7)

Due to the plants being located on the Hanford Reservation, the population is extremely low within the 10 mile zone. With this low population, the study demonstrated that effective notification within the Emergency Planning Zone could be performed by a combination of Emergency Broadcast System radios, U.S. Coastguard clearing the Columbia River, Benton County Sheriff clearing the Yakima River, and two sirens located within five miles of the plant on the Columbia River.

This early warning system described herein has already been submitted, reviewed and approved by the NRC.(8,9,10)

II. WASHINGTON NUCLEAR PROJECTS 1 AND 2 EMERGENCY PLANNING ZONE POPULATION

The Washington Public Power Supply System leases 1089 acres of land on the Hanford Reservation, located north of Richland, Washington, and controlled by the Department of Energy. The reservation covers an area of approximately 570 square miles, consisting mostly of semi-arid land. The land leased by the Supply System is approximately 3 miles west of the Columbia River and 12 miles north of the populated area of Richland.

o Population Estimates

Figure 1 is a map of the Ten-Mile Emergency Planning Zone.(1) This Ten-Mile Emergency Planning Zone is the area for which the Early Warning System has been designed to cover.

Figure 2 presents the compass sector population estimates for 1984. Estimates were made relative to the center of the triangle formed by the three reactors. These figures were taken from the WNP-2 Environmental Report(2) Operating License stages, Amendment #5 where references and bases are given. These figures have been revised to reflect current values and obtained from a population survey conducted by Benton County. The transient industrial workers on the Hanford site have been updated by the appropriate facilities.

o Permanent Residents

Permanent residents included all people residing in the area but excluded occupants of institutions. The ten-mile radius around the site is shown in Figure 1. In 1984, an estimated 2,147 people were living within the Ten-Mile Emergency Planning Zone. The nearest inhabitants occupy farms which are located east of the Columbia River and are thinly spread over five compass sectors. There are no permanent residents located within three miles of the site. Only about 90 persons reside between the three-mile and the five-mile radii; these are all located east of the Columbia River.

Of the 2,147 people residing in the 10-Mile EPZ, about 1,718 live in Franklin County and about 429 in Benton County. None of the residents live in incorporated cities.

There are no significant changes in land use expected in Franklin County over the next several years and, as it is currently irrigated to about the maximum amount practicable, little population increase is foreseen. No significant change in land use on the Hanford Reservation is expected, and no foreseeable population will reside there; however, the unincorporated area near the Horn Rapids Dam on the Yakima River in the SSW sector is expected to be the primary growth area within the 10-Mile EPZ. Population growth within this area is projected to be about six percent per annum.(3)

o Transient Populations

The transient population is divided into three main subgroups: 1) industrial employees, 2) migratory agricultural workers, and 3) sportsmen. Figure 3 illustrates this population location graphically.

Industrial employees in the Ten-Mile EPZ total 8,648. Most of the employees will be located in Benton County and will form the main population to be evacuated, outnumbering the permanent residents by about 4:1.

About one-tenth of the industrial employees will work at WNP-1, WNP-2, WNP-4 and at the Plant Support Facility. The projected size of this work force (approximately 1,000) varies considerably with time; as many as 12,000 workers were employed in June 1981 prior to the slowdown of construction at WNP-1 and the termination of WNP-4, but the figure in September 1982 was down to nearly 5,000.

Current Industrial Employment in the 10-Mile EPZ

1	WNP-1	76
2	WNP-2	772
3	WNP-4	18
4	Plant Support Facility	126
5	Supply System Downtown Complex	338
6	DOE 300 Area	2,532
7	DOE, 400 Area, FFTF, Fast Flux Test Facility	773
8	DOE 1100 Area, Bus Lot, Stores	660
9	DOE 1200 Area, J. A. Jones	200
10	DOE 3000 Area, Pacific Northwest Laboratory	2,003
11	EXXON, Horn Rapids Road Facility	800
12	Others workers	350
	TOTAL	8,648

The majority of these employees work days, but there are a significant number of workers assigned to some shift work. Therefore, the industrial planning figure of 8,648 to be evacuated is conservative.

There are up to approximately 3,346 migratory farm workers in the Ten-Mile Emergency Planning Zone. This figure may be high due to the possibility of double counting during the different harvest periods. The peak season for these workers is May and June; the next highest employment season is during the fall harvest. These workers consist of both permanent and temporary residents of the Tri-Cities area, some living within the Ten-Mile Emergency Planning Zone. The numbers shown on Figure 3 reflect their work locations in Franklin County within the Ten-Mile Emergency Planning Zone, not their residences.

Sportsmen, consisting of hunters, fishermen, and boaters, enjoy activities mainly along the east bank of the Columbia River. The primary fishing season is from June through November; the main hunting season being October through January. The heaviest use of the area by sportsmen is on weekends and holidays in the early morning hours. On the average, 50 fishermen and 10 hunters are present in

Franklin County during the weekdays. This increases to about 100 fishermen and 50 hunters on weekends and holidays. Sportsmen also use the Yakima River, with an estimated maximum of 50 at any time in this area. During peak fishing or hunting times, up to 1,050 sportsmen may be located within the Ten-Mile Emergency Planning Zone.

The main concentration of sportsmen consists of fishermen located just south of the Ringold Fish Hatchery spillway on the Franklin County side of the Columbia River. Hunting consists of both waterfowl (hunted at the Wahluke Hunting Area on the Franklin County side of the Columbia River) and upland game birds (hunted inland on the farmland of Franklin County). Four hundred sportsmen may be located around the Ringold Fish Hatchery and the Wahluke Hunting Area and the rest distributed inland. Of these, 1,000 are assigned to Franklin County and 50 to Benton County. An additional recreation attraction has been created in the south section of the Ten-Mile Emergency Planning Zone in Benton County. An off-road vehicle park has been developed, as many as 500 participants/spectators may be present during an event.

o Special Population

There are no individuals within the Ten-Mile Emergency Planning Zone confined to institutions such as hospitals, nursing homes, or penal institutions. There are three schools, the Edwin Markham Elementary School, the Cypress Gardens School and the County Christian Center, with a total enrollment of approximately 365 students and staff. Although most of these students live within the Ten-Mile Emergency Planning Zone, the total amount was added to the population for this study.

III. EARLY WARNING NOTIFICATION PROCESS

The approach taken by the Supply System in designing the Early Warning System for the Washington Public Power Supply System's Nuclear Projects 1 and 2 is based on a study[7] and correspondence[8-9] submitted to the Nuclear Regulatory Commission (NRC) and approved as meeting the intent of the NRC requirements.[10]

The emergency shall be classified by the Plant Emergency Director as soon as an off-normal event occurs that corresponds to one of the initiating conditions. Each class is defined in such a manner so that emergencies can be classified either up or down, depending on whether the emergency becomes more or less severe. When there is doubt as to the classification of the emergency, the more conservative class shall be used. After classifying the emergency, the Plant Emergency Director will initiate notification of emergency personnel. The extent of the notification will depend upon the emergency classification.

Initial emergency notification to nearby Supply System plants, the State, County, and the Department of Energy will be made through the Security Communications Center. Both phone lines and radio communications are available. The nearby facilities will implement the necessary emergency actions. In the event of an emergency requiring protective measures to be taken at the nearby facilities, the Recovery Manager at the Emergency Operations Facility or the Plant Emergency Director will give specific instructions.

Notification of the County Emergency Dispatch Center and Benton County Emergency Management in Kennewick, Department of Energy, and the Washington State Department of Emergency Management (State Emergency Operations Center) will be by dedicated phone lines. Notification to the Nuclear Regulatory Commission in Bethesda, Maryland, will be made via the NRC dedicated phone network from the Control Room. The Nuclear Regulatory Commission offices in Bethesda will patch the call through to the

Nuclear Regulatory Commission offices in Region V, Walnut Creek, California. Notification of all other offsite emergency agencies will be made by telephone. Radio provides backup communications to the County Emergency Dispatch Center and Department of Energy-RL.

Activation of the Early Warning system is the responsibility of the Benton/Franklin Counties Department of Emergency Management Director.

The Early Warning System is designed to provide both an alert signal and information to the population on an area-wide basis throughout the Ten-Mile Emergency Planning Zone. Two means have been established by the Supply System for notification of the public. For residents within the Ten-Mile Emergency Planning Zone the tone activated radios provide the primary means of notification. These radios are activated by the Emergency Broadcast System signal and provide instructions for protective actions. The system is designed to be operable within 15 minutes of a decision to activate the system.

Notification of transient population along the Columbia and Yakima rivers is provided by the Coast Guard and by local law enforcement agencies, respectively. Two sirens are located along a segment of the Columbia River to help expedite Coast Guard evacuation of the river (Figure 4). Activation of the sirens should reduce the need for Coast Guard person-to-person interactions along the Columbia River upstream from the WNP-2 pump house for about two (2) miles. This is the segment of the river that is most utilized by the public. It is estimated that notification of transients along the Columbia River can be accomplished within three (3) hours.

Notification of transients along the Yakima River is the responsibility of the Benton County Sheriff. Through cooperative agreements under emergency conditions, the Sheriff can call upon other law enforcement authorities to perform various tasks. Primary use areas of the Yakima River are adjacent to Highway 240. Users will be informed as a peripheral task in the process of controlling use of State Highway 240, which will be done by the law enforcement officers in the vicinity at the time

However, it is likely that people not initially alerted by the siren signals or the tone-activated radios will eventually be alerted by TV, radios (not of the tone-activated type), and other informal means, including telephone calls from neighbors, friends, relatives, and word-of-mouth. In addition, the initial activation of the Early Warning System would be followed by subsequent activations to ensure that the total population was alerted.

In conclusion, this report describes an early warning system and process which provides effective early notification to population groups located within the 10 mile Emergency Planning Zone and which is consistent with commitments set forth in our previous submittals to the Nuclear Regulatory Commission.[8-9] The technical basis for the adequacy of the system is documented in a report entitled "Assessment of Early Warning at Washington Public Power Supply System Hanford Site, R.F. Haight, October, 1982.[7] Utilization of this early warning approach was previously approved by the Nuclear Regulatory Commission, February 14, 1983.[10]

When the receivers are not used for receiving emergency information, they may be used to receive the normal KONA programming. Receivers used in this way provide items of considerable day-to-day value to residents, being, in effect, a free radio with one channel of program material. When the programmed material can be received at any time, the resident is also reassured that his receiver is in good working order. The need for frequent testing is thereby eliminated, minimizing annoyance and anxiety to residents.

Distribution of the tone-activated radios is conducted through a coordinated effort between the Benton and Franklin County Department of Emergency Management and the Supply System.

In order to maintain a thorough and complete coverage of the area, various approaches are being used by the Supply System and the Benton County Department of Emergency Management to keep up-to-date records of persons moving into the Ten-Mile Emergency Planning Zone. These are:

- Public Utility Districts
- Post Office route carriers
- County Auditors
- Recanvassing of the area

The primary method will be through the Public Utility Districts and the Post Offices. The alternate approach will be through the County Auditor's Office or, if need be, recanvassing the area. An additional mechanism is the mail returns of a quarterly information newsletter sent to all residents within the 10-mile Emergency Planning Zone. The returned newsletter is an indication of a resident's change.

V. COAST GUARD RESPONSE

The United States Coast Guard maintains river control capability at the City of Kennewick. Agreements and procedures are in place for closing and clearing the river of recreationists. The Department of Energy jet boats are available to assist. Automatic closure of the Columbia River occurs during a General Emergency classification. All other closures are at the request of the Supply System's Recovery Manager. River closure boundaries are from the Old Hanford Townsite to the north to Leslie Groves Park to the south. Arrangements have been made with Benton County Sheriff to transport a Coast Guard representative to the Old Hanford Townsite to meet the Department of Energy boat and an environmental monitor. A Supply System or Washington State environmental monitor will meet the Coast Guard boat at Leslie Groves Park.

VI. SIREN SYSTEM DESCRIPTION

The siren system consists of three pole mounted, 122 db, electronic, omnidirectional sirens. Siren locations and estimated coverage is shown on Figure 4. Each unit is battery powered with solar cells or AC power, that is used to keep the batteries at full charge. Initial experience resulted in cold weather failures. Corrective actions are being implemented to assure operability. In addition, each sirens' batteries are capable of being recharged by external vehicular chargers, if necessary. All electronics, power and control equipment is housed within a weatherproof, pole mounted steel enclosure. The sirens and their associated equipment mount to Class II cedar poles designed to withstand wind loading in excess of 100 mph. The poles are guyed and the area at the base of the pole is graveled for fire protection. Each siren has an appropriate sign warning of the danger of its high sound levels.

The siren control system is a Remote Data Acquisition/Control System that is used for transmitting alarm or status messages between the master station and remote stations. The system uses UHF radio as the communications link. The Data Acquisition/Control System consists of a master station and remote status and control units as follows:

IX. REFERENCES

1. Washington Public Power Supply System Emergency Preparedness Plan, Washington Nuclear Projects 1, 2, and 4.

2. WNP-2 Environmental Report - Operating License Stage Amendment #5, July 17, 1981.

3. Hanford Site Evacuation Time Assessment Study, September 1981.

4. Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654, FEMA-REP-1, Rev. 1, October 1980.

5. Outdoor Warning Systems Guide, CPG1-17, March 1, 1980.

6. Handbook of Noise Measurements, Arnold P. G. Peterson, Copyright 1980.

7. Assessment of Emergency Early Warning at Washington Public Power Supply System Hanford Site, R. F. Haight, October, 1982.

8. Letter: From Robert L. Fergusen, Managing Director Washington Public Power Supply System, to William J. Dircks, Executive Director of Operations NRC, Washington D.C., dated November 8, 1982.

9. Letter: From Robert L. Fergusen, Managing Director Washington Public Power Supply System, to William J. Dircks, Executive Director of Operations NRC, Washington D.C., dated January 17, 1983.

10. Letter: From William J. Dircks, Executive Director of Operations NRC Washington D.C., to Robert L. Ferguson, Managing Director Washington Public Power Supply System, dated February 14, 1983.

11. Siren Equipment Maintenance, Communications Service Instruction, CSI 6.11.

12. Maintenance Schedule, Communications Service Instruction, CSI 2.4.

APPENDIX I

Emergency Broadcast System Radio Specifications

I. SCOPE

To provide seller a description, technical specifications, and testing criteria for tone-activated Emergency Broadcast System radios.

II. INFORMATION

- Required Delivery Date: April 1, 1982
- Instructions: All materials shall be free from defects and imperfections which might affect the appearance, operation, or serviceability of the finished product.

III. SPECIFICATIONS

- Frequency Range: The radio shall operate in the Commercial A.M. Broadcast Band, 525 KHz to 1600 KHz.
- Operating Channel: The radio shall be a single-channel receiver, crystal controlled. Operating frequency shall be 610 KHz.
- Receiver:
  - Sensitivity: 30 microvolts for 20 db S/N as a minimum.
  - Selectivity: 25 db @ 9 KHz.
  - Frequency Stability: .0025% -10 to +50 C.

Hum and Noise: 50 db (at 1 micro volt input).

- o Decoder: The radio shall be capable of decoding the Standard Emergency Broadcast System two-tone attention signal. Upon receipt of the EBS tone, the Decoder shall emit an audible alert tone for a minimum of five (5) seconds and activate an indicator light. The indicator light shall remain on until manually reset.

- o Monitor/Mute Control: The radio shall provide to the user the option of monitoring the channel or, by push-button control, completely mute the radio. Unit shall automatically unmute upon reception of the EBS tones.

- o Volume Control: Audio output shall be user adjustable. Minimum audio level shall be internally adjustable.

- o Audio Output: Maximum audio output shall not be less than 90 db at 12" from the front of the unit. Tester shall use a 1000 Hz tone, modulating the carrier at not more than 100%.

- o Antenna: The antenna shall be built into the cabinet.

- o Speaker: The speaker shall be built into the cabinet.

- o Power Source: AC/DC, the unit shall operate on built-in rechargeable batteries (supplied with the kit). Battery duty cycle shall be six (6) hours, minimum, in the unmuted condition.

- o Battery Charger: Battery charger shall operate on 115 volt, 60 Hz, A.C. power. It shall be capable of operating the radio without batteries. Charger may be internal or external to the radio. If external, it must be UL approved. Charger shall completely recharge dead batteries in sixteen (16) hours with the radio on and in the unmuted condition. Battery charger shall be furnished with an undetachable A.C. power cord not less than six (6) feet long.

- o Cabinet: Unit shall be desk-top mountable equipment with mar-proof feet.

  Size: Not to exceed 8" x 9" x 4".

  Finish: Unit must be attractively finished in an onobtrusive color.

  Weight: Not to exceed seven (7) pounds.

  Controls and Indicators: All controls must be easily accessible from the top or front of the unit. All controls must be clearly labeled.

  Construction: High-impact plastic, as a minimum.

- o Certification: Unit must be certified by the FCC under Part 73.941 of the FCC Rules pertaining to EBS decoder devices.

- Literature: Seller shall provide operator instructions with each unit, plus 100 each extra copies. Seller shall provide three (3) each complete sets of maintenance literature. Maintenance manuals must include circuit schematics, circuit board layout, theory of operation, and a complete parts breakdown with part numbers. Seller shall provide spare parts breakdown with unit cost and availability as part of his bid response.

- Life Expectancy: Calculated Mean Time Between Failure (MTBF) shall be 50,000 hours minimum; seller shall provide rationale used to determine MTBF.

- Warranty: Seller shall warrant each unit to be free from defects in material and workmanship for a period of ninety (90) days after receipt. Seller will replace or repair the product at no charge to the buyer during the 90-day period. Seller will pay any shipping charges incurred for the reason of warranty repair. Seller shall warrant parts for a period of one (1) year after receipt of units.

APPENDIX II

Siren Specifications

I. SCOPE

This specification provides for the purchase of two separate types of sirens. The basic difference between the Type I and the Type II siren is the power supply. Type I is to be a self-powered unit; Type II will be a commercially powered unit. The Supply System intends to purchase seven (7) each Type I sirens and seven (7) each Type II sirens. The Seller shall design and supply a complete, ready-to-install-and-operate unit for either Type I, Type II, or both types of sirens. The seller is not required to provide radio control equipment or siren pole. The bid should include accessories such as siren mast, conduit, electrical enclosures, etc. The Supply System will provide radio control equipment and pole.

II. DESIGN REQUIREMENTS, BOTH TYPES

o General

Sirens are to be used in an outdoor warning system and should be constructed such that dust collection, water collection, and water condensation will be minimized. Siren Systems shall be of rugged construction so as to withstand self-induced vibration and exposure to severe weather conditions without excessive deterioration and shall be instantly and dependably operable after long periods of nonuse. Openings shall be suitably protected to restrict entrance of birds or small insects.

- Materials

Materials not definitely specified shall be of the best commercial quality suitable for this purpose. All materials shall be free from defects and imperfections which might affect the serviceability of the finished product. All parts subject to corrosion shall be fabricated of corrosion-resistant material or suitably treated to resist corrosion.

- Control Cabinets

Control cabinet fronts should be removable and secured to the cabinet with hinges. Cabinet fronts should be sealed with a moisture-resistant neopreme gasket permanently secured to the door frame. Cabinet surfaces should be bonderized or phosphatized, sprayed with a nonferrous primer and activator, and finished with an aluminum-vinyl paint or equivalent to ensure protection from corrosion.

- Motors

All motors and/or motor enclosures should be of a suitable weather-proof design to provide reliable operation under the required environmental conditions. Bearing enclosures should be designed to prevent the entry of contaminants and lubricants chosen for extreme temperature conditions so as to prevent the necessity of frequent maintenance. (Sealed lifetime bearings are preferred.)

- Environmental

The siren system will be designed to operate within the following ambient environmental conditions:

Temperature	-25°F to 120°F
Relative Humidity	0 to 95
Altitude	400 to 1000 feet
Ice Loading	0 to 2 inches
Wind	0 to 125 mph

- o Equipment Housing

  Equipment housing that cannot be pole mounted shall be designed for direct burial.

- o Mounting

  Sirens shall be suitable for mounting on top of a Class II cedar pole. Sirens shall be supplied complete with mounting hardware.

- o Bolts, Pins, Etc.

  All screws, pins, and bolts, shall be installed with a positive means of protection against their working loose due to vibration.

- o Welds

  Weld connections shall be continuous; spot welding of sheet metal is not permitted.

- o Paint

  All parts to be painted shall be thoroughly cleaned according to the paint manufacturer's specification. All surfaces shall be painted with metal etch primer and at least two (2) coats of weather-resistant paint. Paint color to be Battleship Gray.

III. PERFORMANCE, BOTH TYPES

Each siren shall be capable of providing an alerting signal with a minimum of 122 db(c) at any point at ground level, assuming a 50-foot, above-ground installation. The alerting signal shall be a steady "on" tone within a frequency range of 200 Hz to 500 Hz radiated omni-directionally. Sound output shall not decline more than 2 db(c) below full rated output during the three-minute alert signal.

IV. LOCAL CONTROLS, BOTH TYPES

- o Each siren shall have controls to activate all required and appropriate siren functions from the siren location.
- o Once activated, the siren shall automatically deactivate after three minutes and automatically reset.
- o Siren test.
- o Siren off.

V. REMOTE CONTROL INTERFACE, BOTH TYPES

Each siren shall be capable of being remotely activated, operated, and monitored by a radio-controlled system (supplied and installed by the Supply System). All control functions shall be accessible through a radio control interface. The following signals will, as a minimum, be applied by the radio control system to the radio control interface to activate the specified function.

- o Siren "Alert" Signal On - A momentary contact which will start the three-minute "alert" signal.

- o Siren Cancel - A momentary contact closure which will stop the siren signal before the three-minute period has elapsed.

- o Bidder shall specify all necessary additional control functions up to a total quantity of four (4).

VI. REMOTE STATUS INDICATIONS, BOTH TYPES

Each siren will be capable of remotely indicating status of siren functions through the radio control system by means of contact closures at the radio control interface. Bidder shall specify necessary status points up to a total quantity of four (4).

VII. POWER SUPPLY, TYPE I SIREN

- o The Type I siren unit shall be capable of providing the three-minute alert signal at least four (4) times per day. The siren unit need not provide more than 10 three-minute alert signals in a five- (5) day period. Recharge of the siren unit power supply shall be automatic.

- o Type I siren shall provide input power to the radio control system. This radio equipment requires 6.0 amp hours at 12 VDC per day.

- o Fuel tank, if required, shall be of a sufficient size to provide 1.3 years of fuel minimum, assuming one 30-second test each month, ten three-minute activations, diesel exercise time, radio control system load, and battery recharge time.

VIII. POWER SUPPLY TYPE II SIREN

The Type II siren shall be electrically powered and shall operate on a maximum of 480V, three-phase, 60 Hz alternating current. Duty cycle shall be continuous once activated; however, siren shall automatically deactivate after three (3) minutes.

IX. FACTORY ACCEPTANCE TEST

Seller shall perform an acceptance test prior to shipment. Buyer shall review and approve factory acceptance test procedure (ATP) prior to the ATP being performed. Buyer shall have the option of observing the factory acceptance test.

X. DOCUMENTATION FURNISHED BY SELLER

- Each document submitted by the Seller shall be clearly identified by the Purchaser's name and purchase order number, the equipment description, specific identification, and the manufacturer's name and address.

- The seller shall provide the following within 30 days after receipt of order.

  a. A production schedule showing hold and inspection points. Buyer may, at its option, witness and approve any and all inspections.

  b. One sepia and three prints of all drawings. The Buyer reserves the right to reproduce any and all drawings or prints received that it considers necessary for maintenance, despite any notice prohibiting the same appearing on the drawings or prints.

c. Eighteen (18) copies (nine (9) each of Type I, nine (9) each of Type II) of their installation, operating, and maintenance manual for each type of siren provided. The equipment manual should include the following:

- o Section 1 - General Description
- o Section 2 - Installation
- o Section 3 - Theory of Operation
- o Section 4 - Calibration
- o Section 5 - Preventative Maintenance
- o Section 6 - Corrective Maintenance
- o Section 7 - Drawings and Wiring Diagrams
- o Section 8 - Parts Identification

d. Three (3) copies of the Seller's recommended spare parts list for each type of siren. All parts listed shall be categorized as Parts Common and Parts Peculiar. Parts include those parts which are considered unique and are not commonly available from local sources.

e. Three (3) copies of the proposed factory acceptance test procedure for the siren systems and three (3) copies of the approved Acceptance Test Procedure. Three (3) copies of the results (data sheet or report) of the Acceptance Testing of each siren.

f. A technical installation specification and a post installation acceptance test procedure. These will be used by the Buyer to write an installation contract.

XI. TRAINING AND SPARE PARTS

Seller shall provide maintenance training for eight (8) members of the Buyer's maintenance staff at the Buyer's location. Training shall take place not more than sixty (60) days after delivery of siren equipment. Bidder shall provide a recommended spare parts list. Spare parts prices shall be quoted as separate line items.

XII. WARRANTY

Bidder shall specify warranty offered with equipment.

XIII. MEAN TIME BEFORE FAILURE

Bidder shall provide Mean Time Before Failure (MTBF) information for each siren system.

XIV. BID EVALUATION

The Buyer intends to purchase sirens from the Bidder or Bidders who meet all of the requirements of the preceding specifications in accordance with, but not limited to, the following criteria:

- Completeness of Design
- Cost Effectiveness
- Operating and Maintenance Cost
- Control and Monitor Interface
- Delivery
- Installation Requirements
- Simplicity of Design
- Warranty
- Mean Time Before Failure

XV. EXCEPTIONS

If the Bidder takes any exception to this specification, the exception shall be itemized and described in detail and included as an integral part of the proposal. Any exception may result in the rejection of the bid.

APPENDIX III

Siren Radio Control Specifications

I. REMOTE STATION

1. Status Reporting

Each Status and Control Unit shall be capable of two-way communications with a Master Station and shall be capable of reporting up to four (4) input conditions (Status Points) plus a Test Indication.

- o Input Circuits

The inputs shall accommodate a dry-contact closure. The position of this dry contact will be maintained during the unit's transmission; the unit shall report the status of this input. The input circuit shall operate with an input loop resistance of up to 3000 ohms. Transient protection shall be provided for all external inputs in accordance with the IEEE Surge Withstand Capability Recommendations (ANSI C37.90a). The equipment shall be protected against damage from high-voltage transients; false messages shall not be reported as a result of these transients.

- o Reporting Scheme

The unit shall report all of its information upon reception of an interrogation message from the Master Station.

An interrogation shall initiate a program of redundant transmissions. Each transmission shall take no more than two (2) seconds. Message redundance shall be programmable from one (1) to at least three (3) transmissions per interrogation.

o Interrogation

Each Status and Control Unit shall accept an interrogation message from the Master Station. This interrogation message shall cause transmission (not more than two (2) seconds long) of all the Status and Control Unit's information.

A special test switch shall be provided to permit the transmission of a Manual Test Message. The Test Transmission shall transmit all of the Station's information, plus a unique Test Message Indication.

o Address

Each Status and Control Unit shall have a unique address. This Station address shall be user changeable.

2. Control Section

The Control Section shall be supplied with a minimum of four (4) control relays. Relays shall be momentary-contact closure (one- (1) second closure). One (1) command function shall operate one (1) relay. The Control Section shall respond to commands directly addressed to it; it shall also respond to commands addressed to all Remote Units.

o Output Relay

The following types of Output Relay Closures shall be possible:

- Momentary-Contact Closure (one- (1) second closure) - One (1) command function shall operate one (1) relay.

- Latched-Contact Closure - One (1) command function shall operate one (1) relay.

It shall be possible to combine different types of relay actuations in the same unit, as determined by individual jumpers. All relays shall be plug-in. Contacts shall be rated at 2 amp, 250 VAC, as a minimum.

Each Status and Control Unit shall transmit an acknowledgement message upon reception of a control command. Acknowledgement shall include station address. An acknowledgement shall initiate a program of redundant transmissions.

A time-diversity transmission technique shall be used; i.e., each Remote Unit shall have a variable time interval between its redundant transmission.

3. Construction

The Status and Control Unit shall be housed in a 16-GA steel enclosure, minimum, with a hinged, gasketed door. Enclosure shall meet NEMA weatherproof specifications as a minimum. The housing shall measure not more than 36" H x 30" W x 12" D. The housing shall be suitable for pole mountings and shall be lockable.

External connections shall be made via a screw-type barrier strip capable of accepting an AWG #14 wire termination.

The equipment shall operate, as specified, over an ambient temperature range of -30°C to +60°C, with a relative humidity of up to 35 percent, noncondensing.

4. Power Supply

Fourteen (14) Status and Control Units (including radio) shall operate from a D.C. power supply (supplied by Buyer) of 12 VDC ± 2 volts. Status and Control Unit shall provide appropriate input fuse or circuit breaker mounted in or on the Status and Control Unit. The Status and Control Unit's current requirements from the power supply shall not exceed 250 MA in standby, 800 MA during control functions, and 3 amps during transmission.

II. MASTER STATION

The Master Station shall provide all specified control and display functions for fifteen (15) Remote Units and be capable of expansion to twenty (20) Remote Units, all within the original Master Station.

The functions that the Master Station shall perform are as follows:

- o Operator interface via a control panel
- o Message reception
- o Message transmission
- o Data display and hard copy printout

1. Control Panel Functions

The operator Control Panel shall enable the Operator to perform the following functions:

- o Issue a single command that will activate one function at a Remote Unit or all Remote Units.
- o Issue manual interrogation requests to individual Remotes.
- o Lock and unlock the keyboard for commands.
- o Reset individual alarm displays.
- o View Remote Station status.

- o Display and print time of day, optional.
- o Reset audible alarm.
- o Enable/disable printer.

2. Message Reception

Each Remote Unit's Status Inputs shall be displayed at the Master Station plus Test Message Indicator.

The Master Station shall be able to receive messages from the Remote Units that are replies to interrogation requests.

The Master Station shall decode the Remote Unit's transmissions. If the message format uses data bits, then the Master Station shall check the validity of each received message. The Master Station shall provide an indication upon any change in the state of a Remote Station's Status Inputs.

3. Message Transmission

The Master Station shall have expansion capability of transmitting messages to up to twenty (20) Remote Station addresses. The Master Station shall be equipped for fifteen (15). There shall be two (2) types of messages transmitted: commands and interrogation messages.

- o Commands

  Comand messages shall be transmitted to either a specific Remote Unit address or to all Remote Unit addresses. "Group" commands shall not take more time to program and transmit than commands to individual stations.

Commands shall be issued manually by the Operator. Manual commands shall require at least two (2) button operations to be transmitted. The Master Station shall be capable of sending a minimum of four (4) control commands to each Remote Unit.

o Interrogation Messages

The Master Station shall be capable of transmitting manual interrogation messages to individual units. The Remotes shall respond to the interrogation message by transmitting a cycle of all of its information.

If a Remote Unit fails to answer an interrogation request, the Master Station shall provide indication of Remote Station failure.

4. Manual Commands

A Control Keyboard shall be provided for manual commands. A means of locking the keyboard is required; an indication shall be given on the Control Panel to show whether it is locked or unlocked.

A command shall be entered into the Master Station via the keyboard. The command shall be transmitted by pressing a Control Pushbutton and the Send Pushbutton simultaneously for at least .5 seconds.

A visual display of the operator-programmed control command code is required prior to transmitting the control command.

5. Data Display

The Master Station shall contain a section for displaying Remote Unit Data. Each display shall be capable of identifying and displaying for each Remote the Station Address, the Status of its Inputs, Station Fail (no acknowledgement), and Test Indication. A change in status of any input shall flash an indicator light and, in some cases, sound an alarm on the Master Station.

6. Normal/Alarm Condition

It shall be possible to define a normal and alarm condition for each Status Input. These definitions may be common for all corresponding points in the System, i.e., all Status Inputs #3.

III. REMOTE CONTROL INITIATION COMMAND STATION

This Station's primary requirement is to turn on and off all sirens; therefore, its function is to provide control signalling to all Remote Stations.

This Station shall report its status to the Master Station in accordance with Section I of this specification.

This Station will not be controlled from any point nor will it monitor status of any remote point. However, it must accept interrogation from the Master Station in accordance with Section I of this specification.

1. Power Supply

The Remote Control Initiation Station shall operate from 120 VAC ± 20 percent, 60 Hz power.

2. Construction

This Station shall be suitable for wall mounting or desk-top application. All circuitry called out in this part shall be housed in one lockable enclosure, with the exception of the Control Keyboard. The housing shall measure not more than 30" x 30" x 12". The housing and equipment shall not weigh more than forty (40) pounds.

3. Front Panel

All switches and indicator lights shall be individually color coded. All switches shall be spring loaded; power-on, power-off switch shall not be accessible from the front panel. An A.C. power indicator light shall be provided on the front of the unit.

The "Siren-On" command and the "Siren-Off" command are the only command functions required at the Remote Control Initiation Command Station. A "Siren-On" indicator is desirable, but not mandatory.

IV. RADIO EQUIPMENT

The System shall use UHF radio as the communications link. The radio channel to be used is an existing Washington Public Power Supply System two-way radio channel. The Siren Control Radio System called out in this specification shall be licensable under FCC Rules and Regulations, Part 90, Subpart J. The equipment shall be listed on the FCC's current equipment list, "Acceptable for Licensing," and designated for use as an operational fixed station under Part 90.203. All radio equipment shall be equipped with a Time-Out Timer which will automatically deactivate the transmitter in the event the carrier remains on for more than one (1) minute.

1. Remote Station and Remote Initiation Station, Radio

The Remote Station radio must be FCC type, accepted for Remote Station application. Only subaudible coded squelch shall be used; Seller shall provide digital coded squelch, if possible. Digital Code #131 shall be used or Tone Code 110.9 Hz. Transmitter power shall not be less than 1.5 watts but not more than ten (10) watts (two (2) watts is preferable). (See radio specification.) Seller shall provide a UHF Yagi antenna with at least 10 db of gain and 15 db front-to-back radio. Antenna shall be supplied with mounting hardware for mounting to a 2" O.D. pipe. Seller shall provide 70' of transmission line for each station. Transmission line shall be 1/2" foam-dielectric heliax cable (less than 2 db attenuation per 100'). Antenna, transmission line, and radio shall be supplied with matching connectors.

2. Master Station, Radio

The Master Station transmitter power shall be at least two (2) watts but not more than twelve (12) watts. The radio shall be external to the Master Station and capable of control from the Master Station at a distance up to 100 feet. Receive audio, desk microphone, and push-to-talk shall be provided to the Operator at the Master Station. All other requirements are the same as the Remote Station Radio.

3. Radio Specifications

The radio shall meet or exceed the following:

- o Frequency Stability ± .005% -20°C to 60°C
- o RF Spurious & Harmonic Emissions -60 db

o	Receiver Sensitivity for 20 db Quieting	.5 UV
o	Intermodulation EIA Sinad	-75 db
o	Selectivity EIA Sinad	85 db @ 1000 Hz ± 3.0 KHz Deviation
o	Audio Output	.5 Watts

The radio shall be supplied with a microphone-input and a microphone-and-receive audio output (a speaker/microphone handset is acceptable).

(NOTE: This is not a siren system which can be used to broadcast messages over the sirens.)

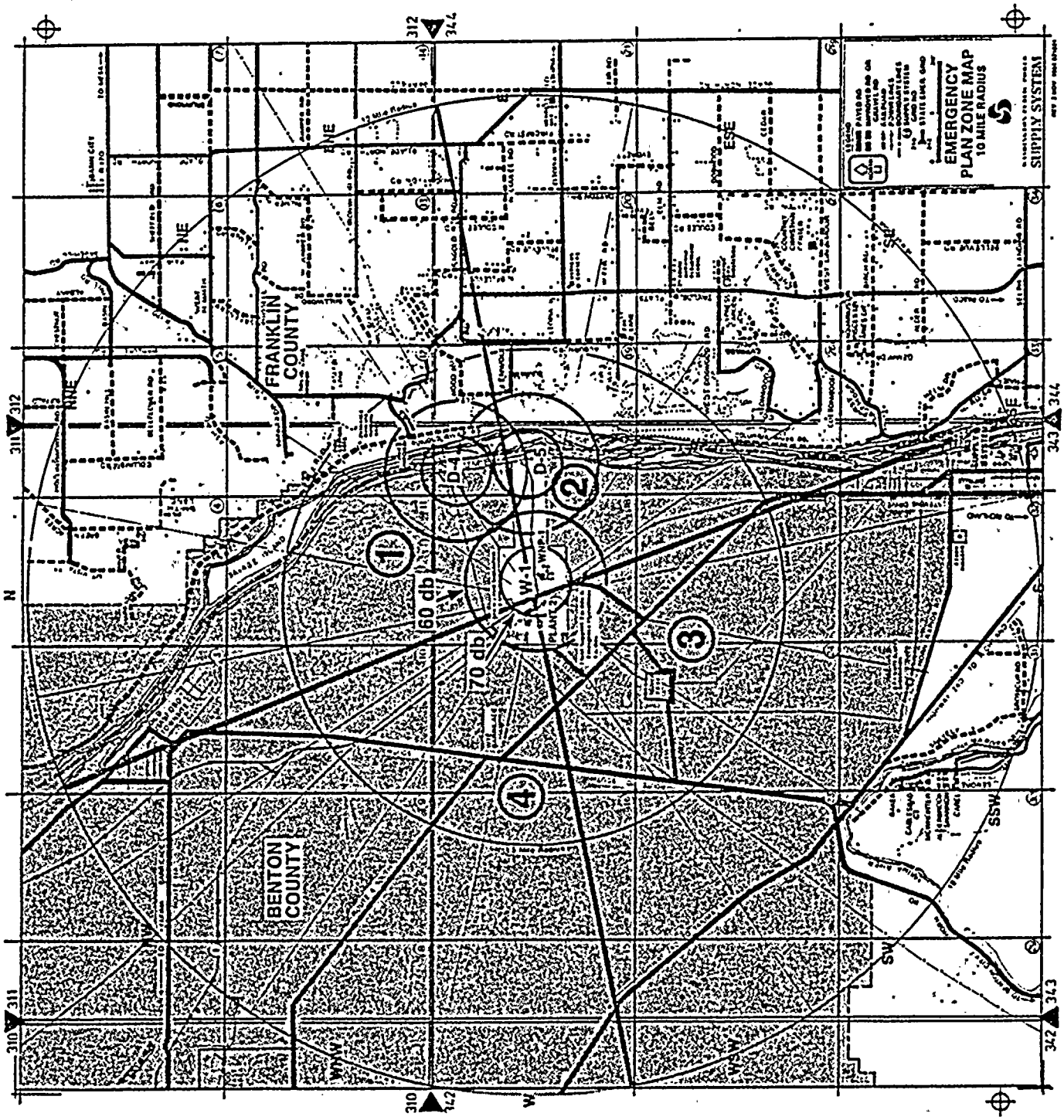
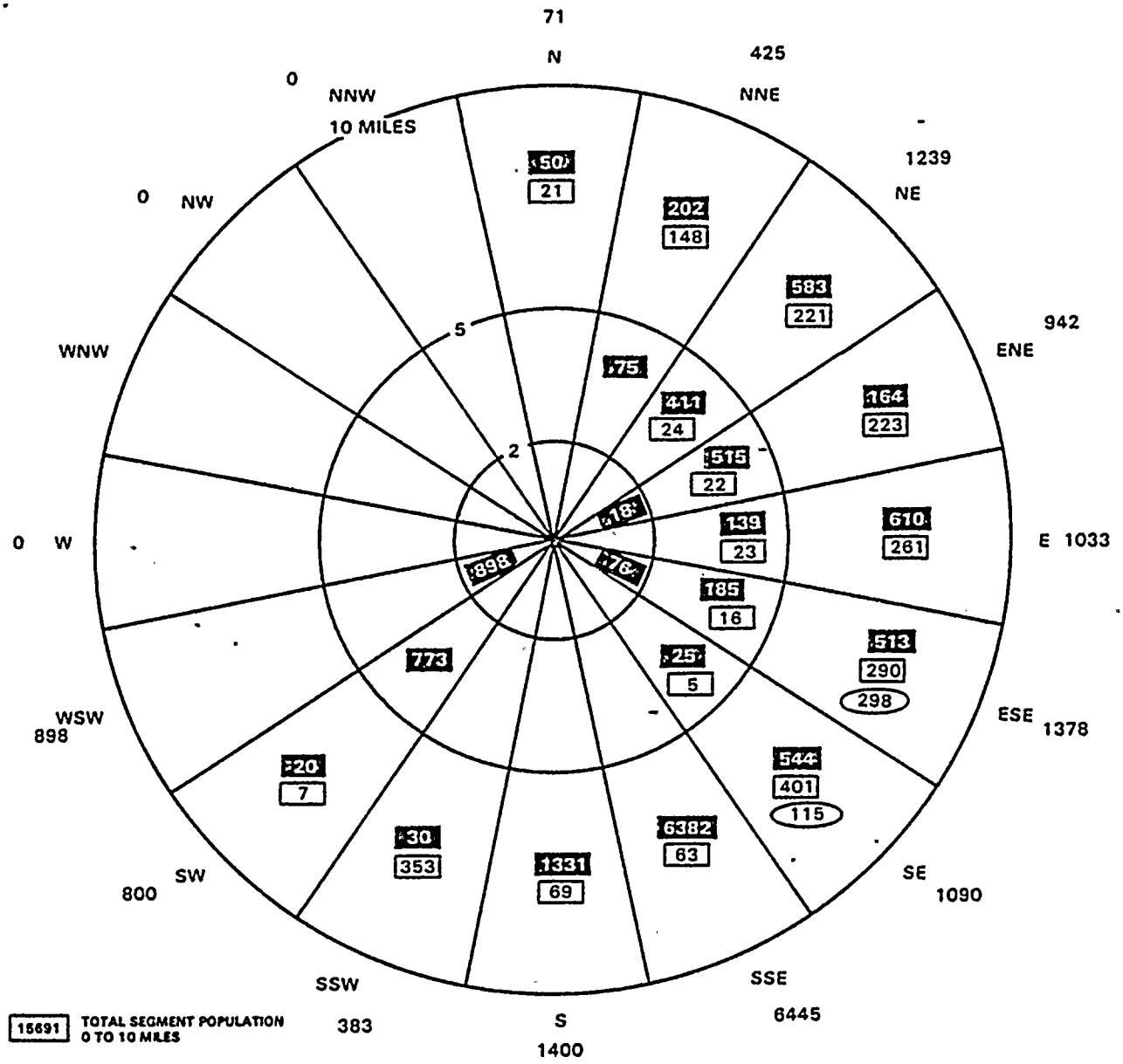


FIGURE 1 10 MILE EMERGENCY PLAN ZONE MAP



15691 TOTAL SEGMENT POPULATION 0 TO 10 MILES

POPULATION TOTALS–PERMANENT			
RING, MILES	RING POPULATION	TOTAL MILES	CUMULATIVE POPULATION
0–2	0	0–2	0
2–5	90	0–5	90
5–10	2057	0–10	2147

POPULATION TOTALS–TRANSIENT			
RING MILES	RING POPULATION	TOTAL MILES	CUMULATIVE POPULATION
0–2	992	0–2	992
2–5	2123	0–5	3115
5–10	10429	0–10	13544

POPULATION TOTALS–SPECIAL			
RING MILES	RING POPULATION	TOTAL MILES	CUMULATIVE POPULATION
0–2	0	0–2	0
2–5	0	0–5	0
5–10	413	0–10	413

POPULATION TOTALS			
RING MILES	RING POPULATION	TOTAL MILES	CUMULATIVE POPULATION
0–2	992	0–2	992
2–5	2213	0–5	3205
5–10	12486	0–10	15691

FIGURE 2 POPULATION WITHIN THE 10 MILE EMERGENCY PLANNING ZONE

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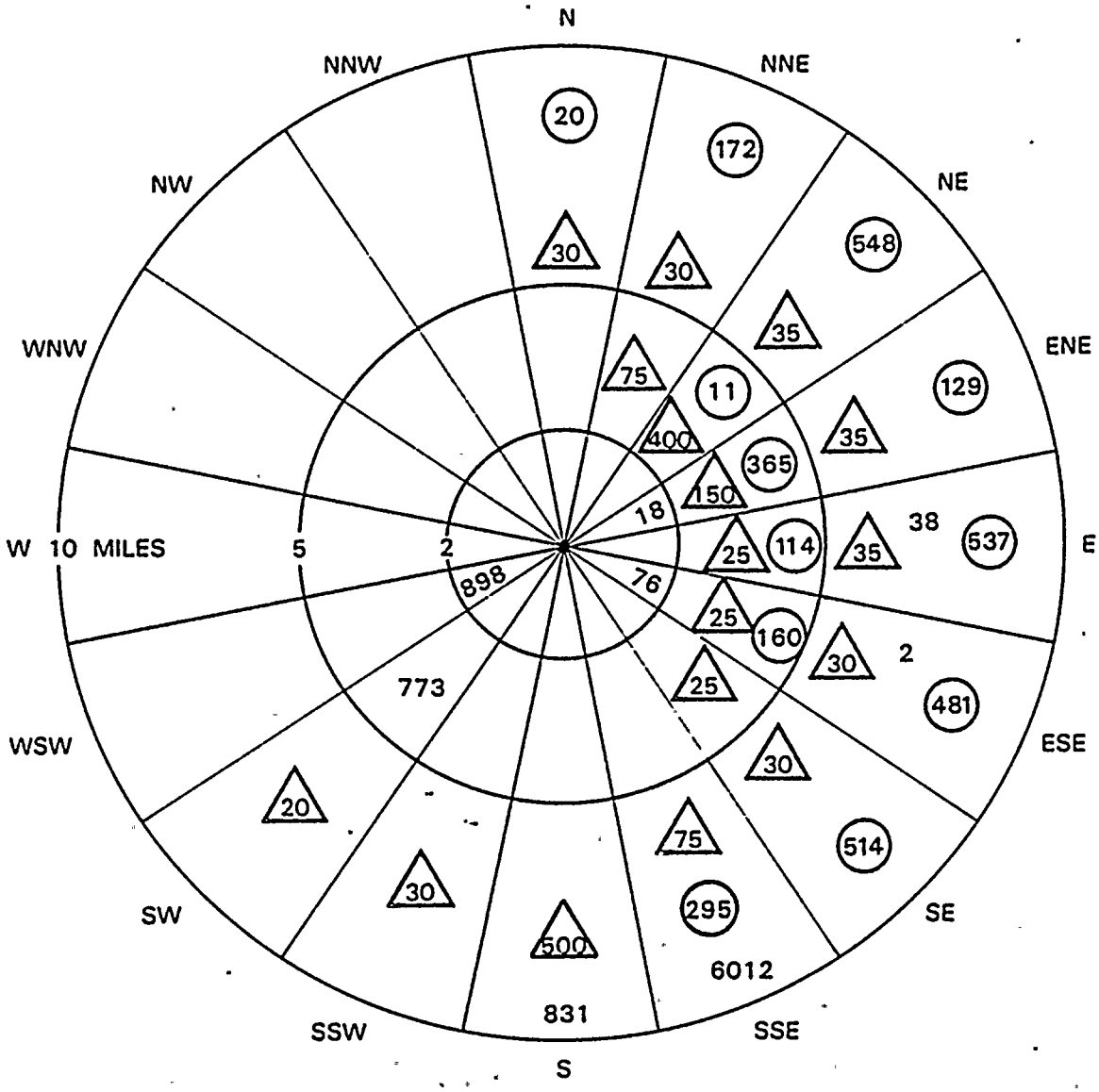
JULY 1984
REVISION 4



KEY

Industrial Employees	898
Migratory Agricultural Workers	(20)
Sportsmen	△30

FIGURE 3 DISTRIBUTION OF TRANSIENT POPULATION WITHIN 10 MILES OF SITE

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JULY 1984
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SIREN COVERAGE

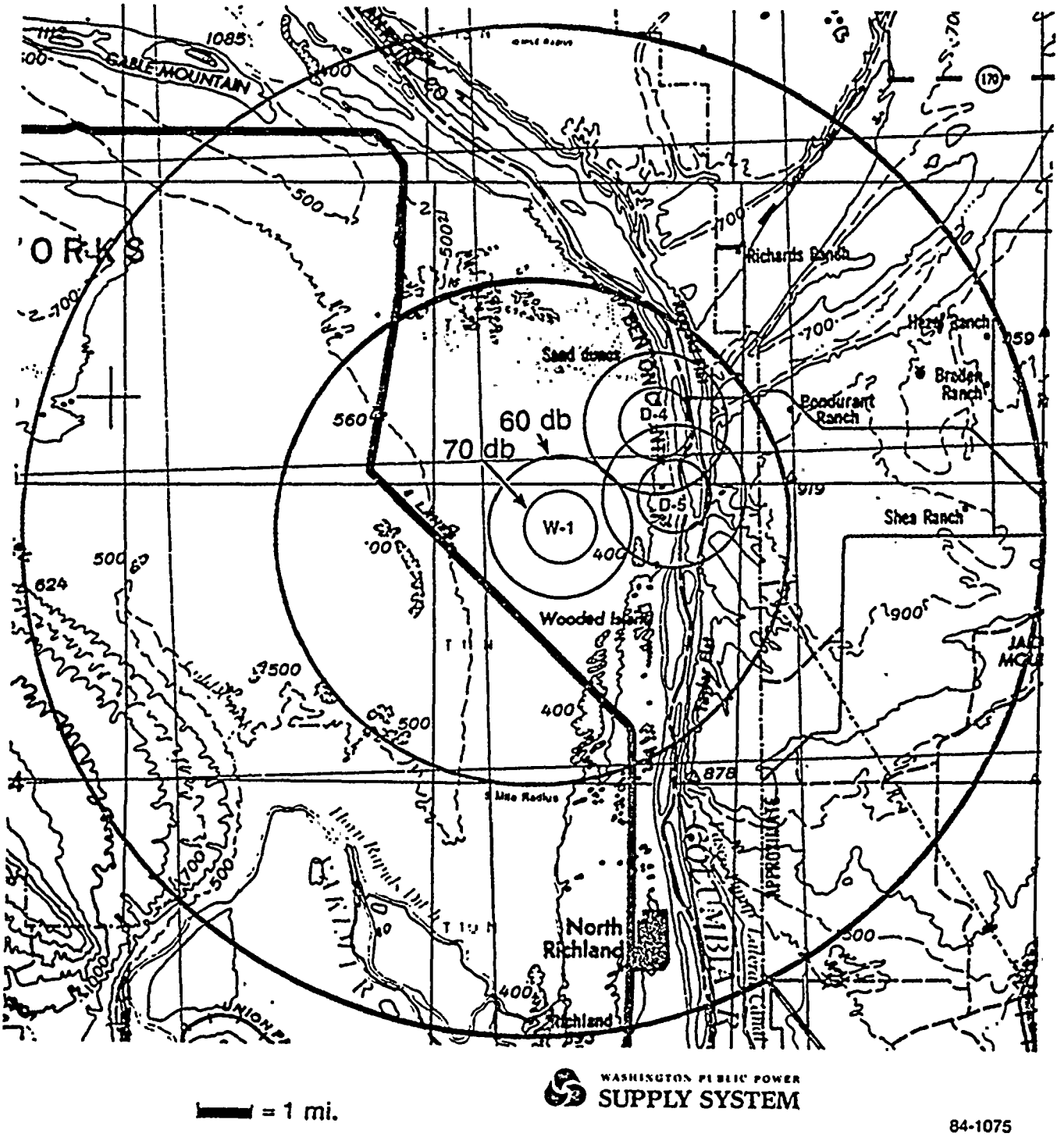

FIGURE 4 SIREN/EMERGENCY BROADCAST SYSTEM COVERAGE CONTOURS

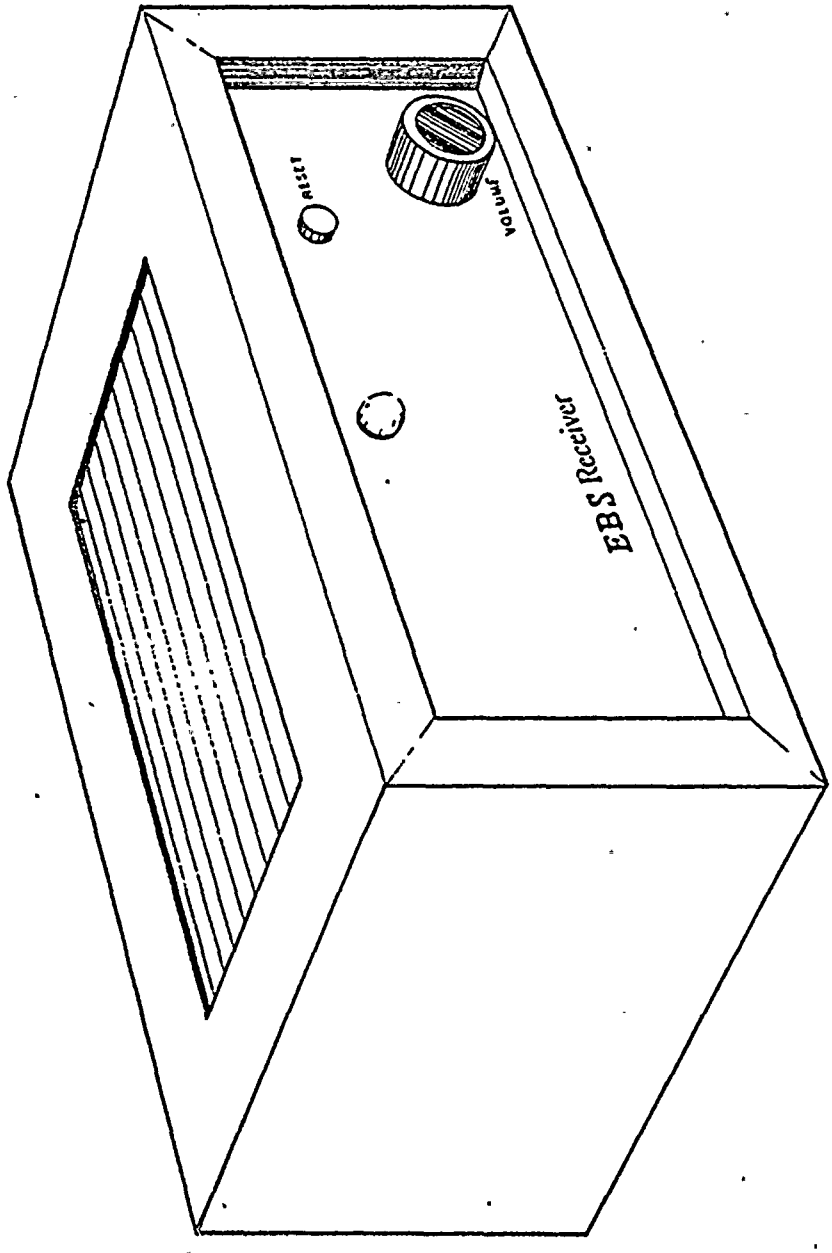

FIGURE 5 EBS TONE ACTIVATED RADIO

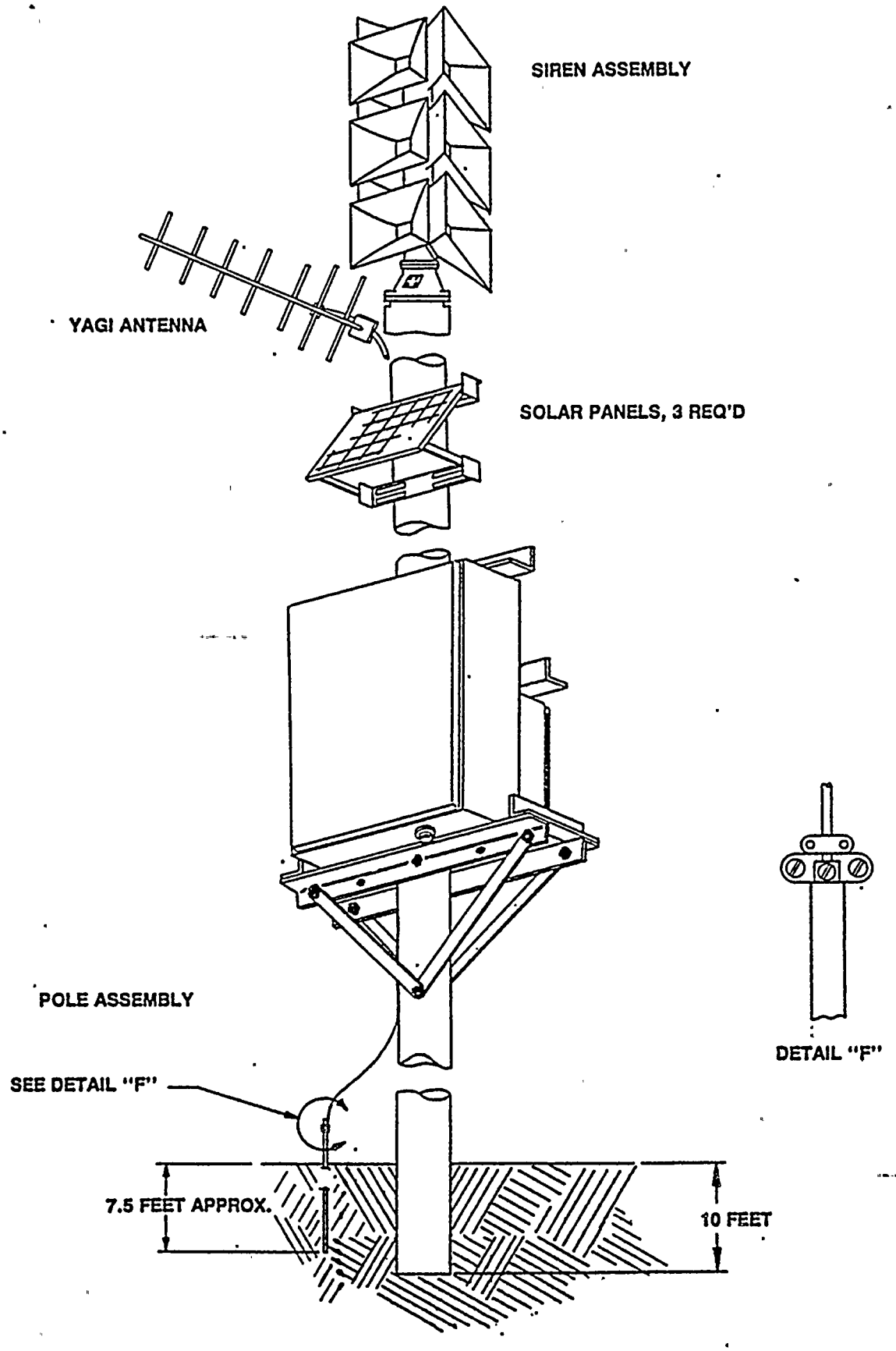

FIGURE 6 TYPICAL SOLAR SIREN INSTALLATION

~~Robert F. Wilk~~

CRAIG WINGO - FEMA

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Room 506 ~~00~~

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