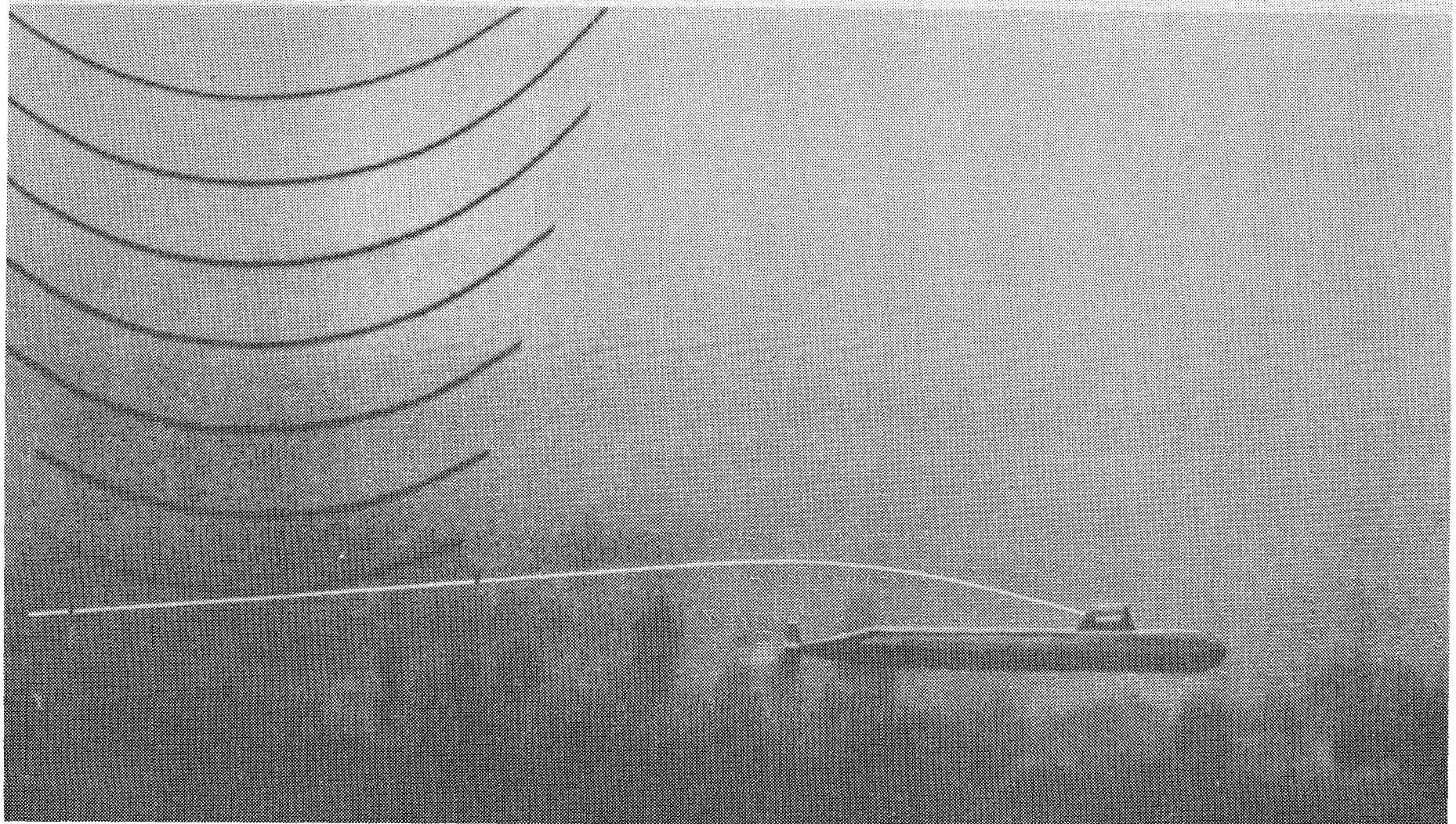
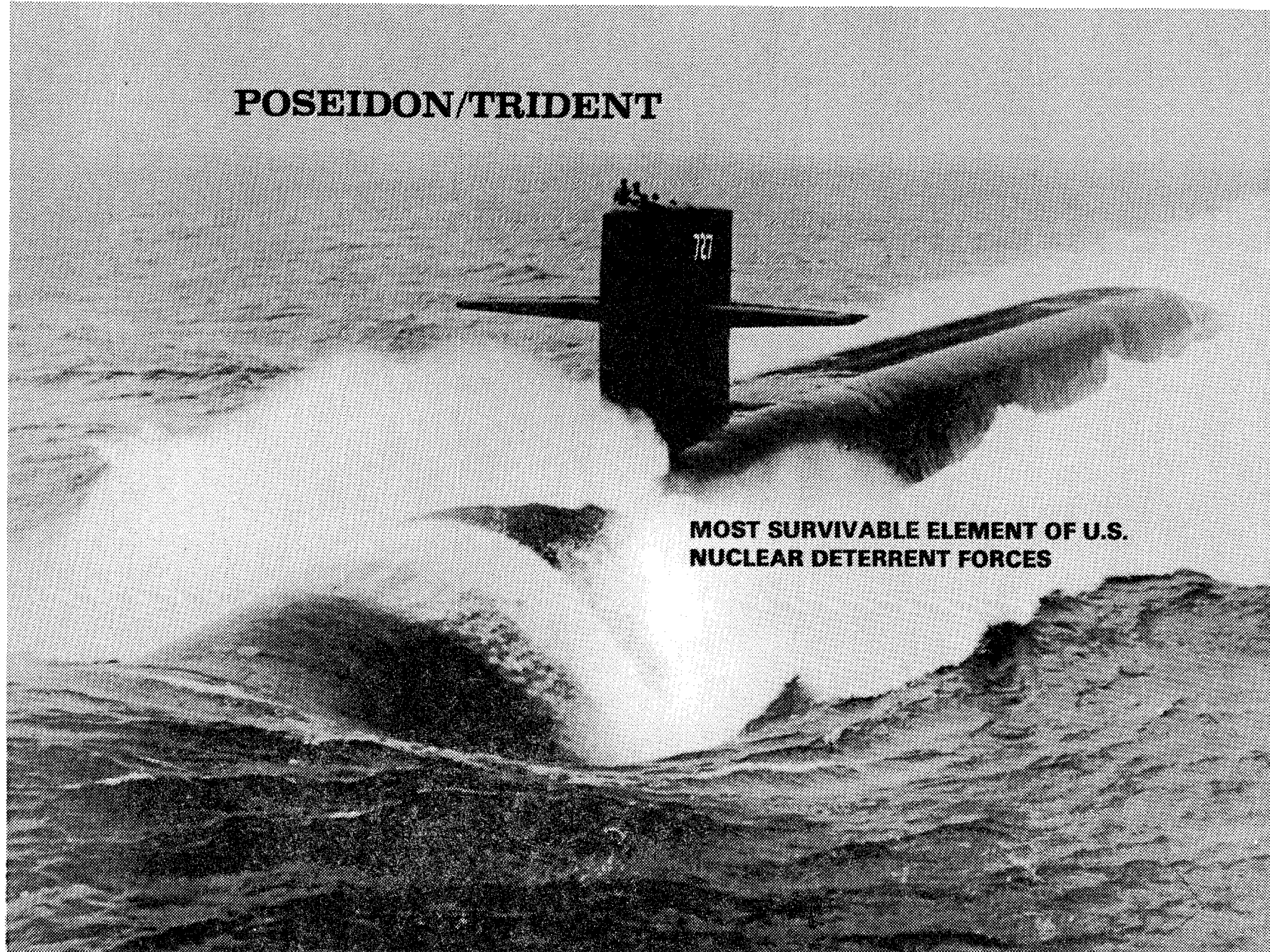


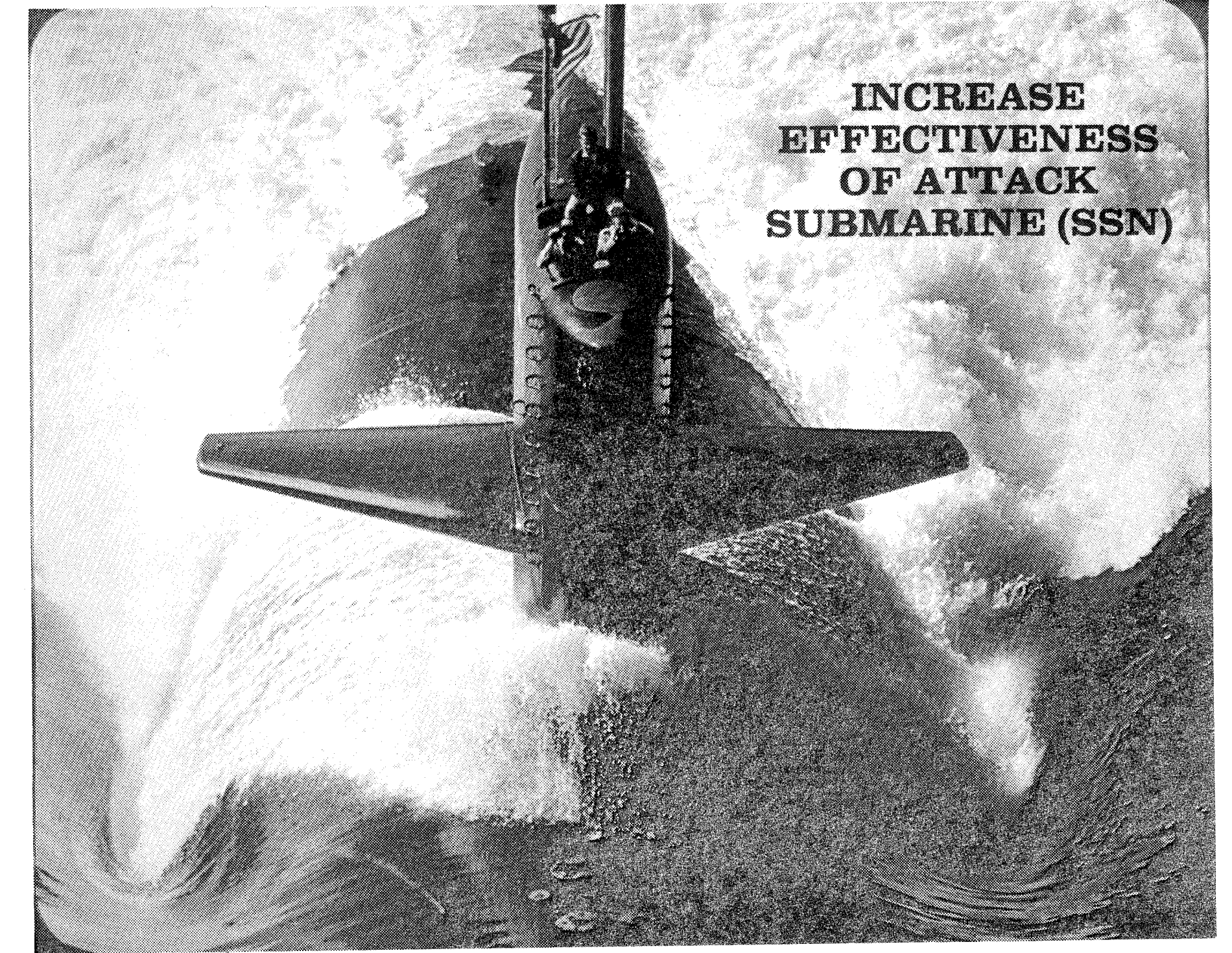
# ELF COMMUNICATIONS SYSTEM



# **POSEIDON/TRIDENT**

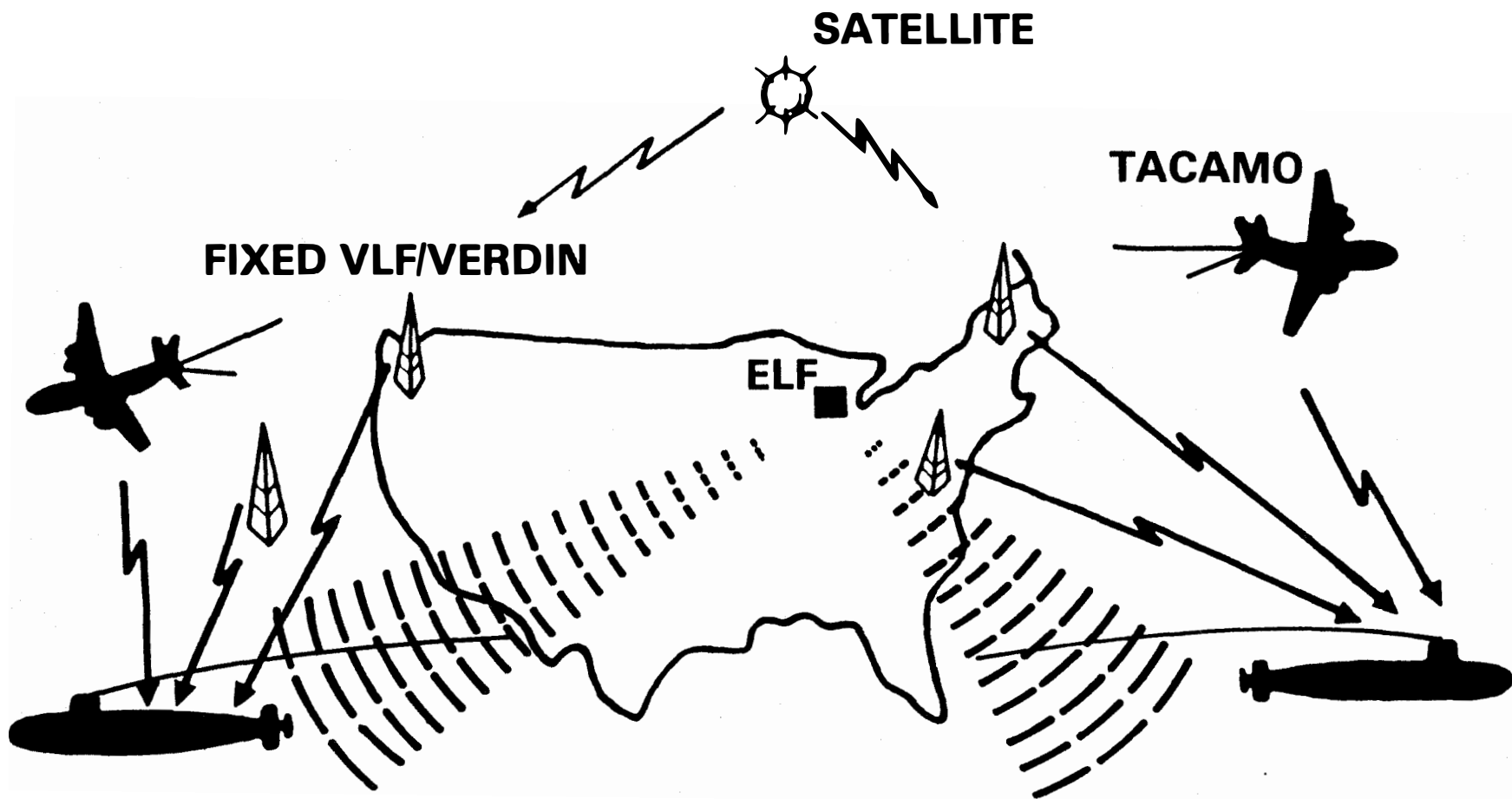


**MOST SURVIVABLE ELEMENT OF U.S.  
NUCLEAR DETERRENT FORCES**

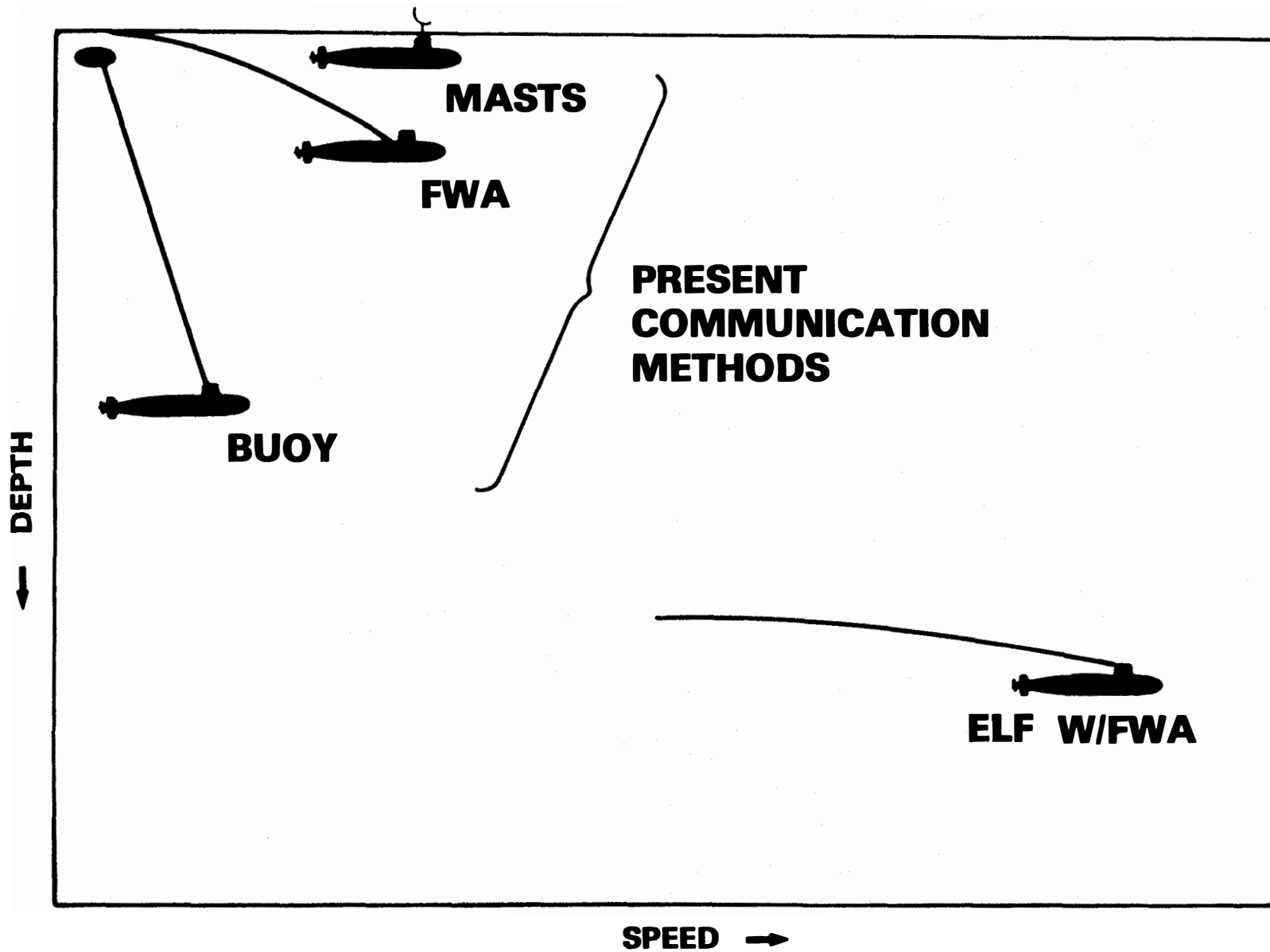


**INCREASE  
EFFECTIVENESS  
OF ATTACK  
SUBMARINE (SSN)**

# COMMUNICATIONS TO SUBMARINES



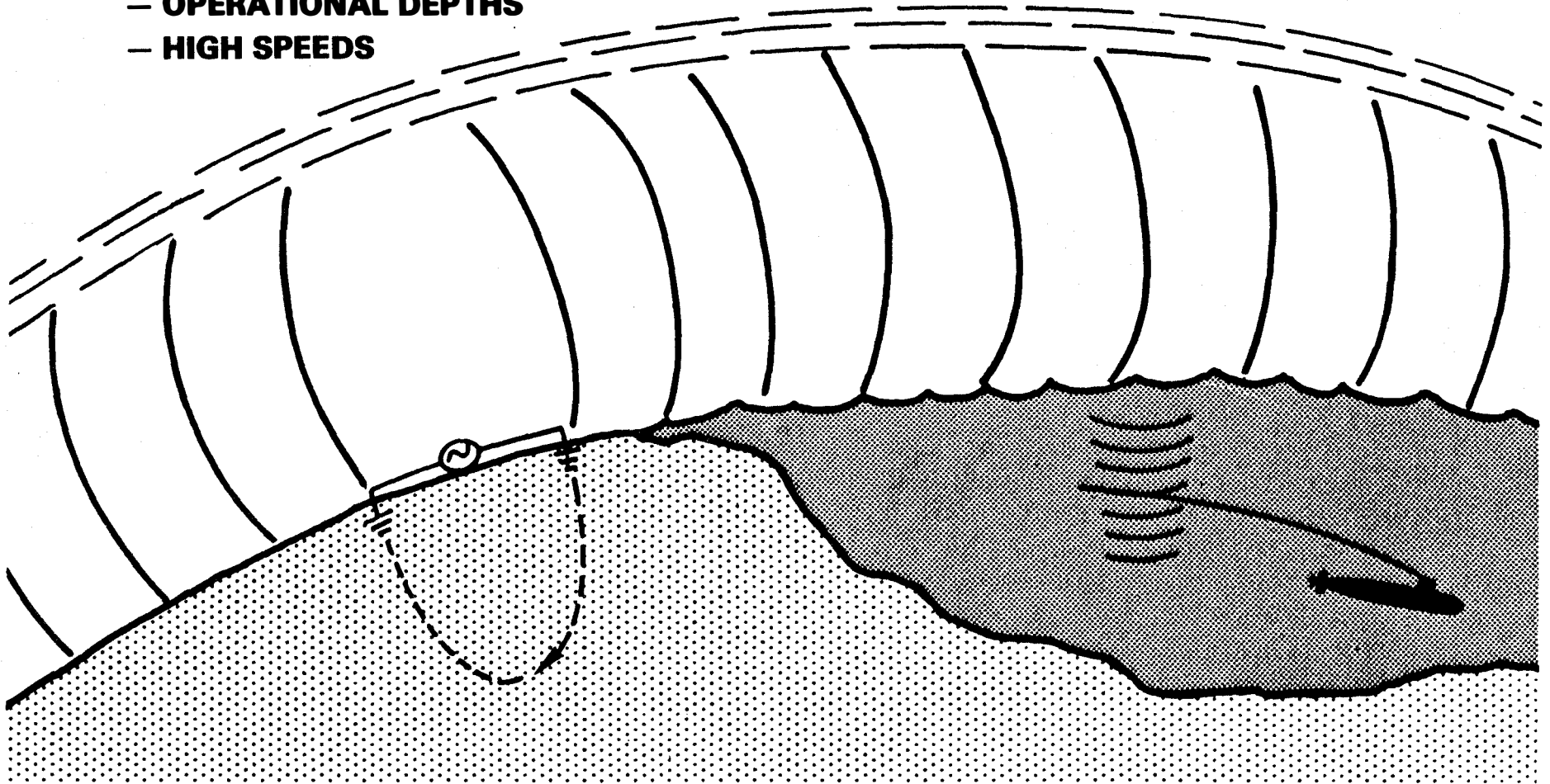
# SUBMARINE RECEIVING METHODS



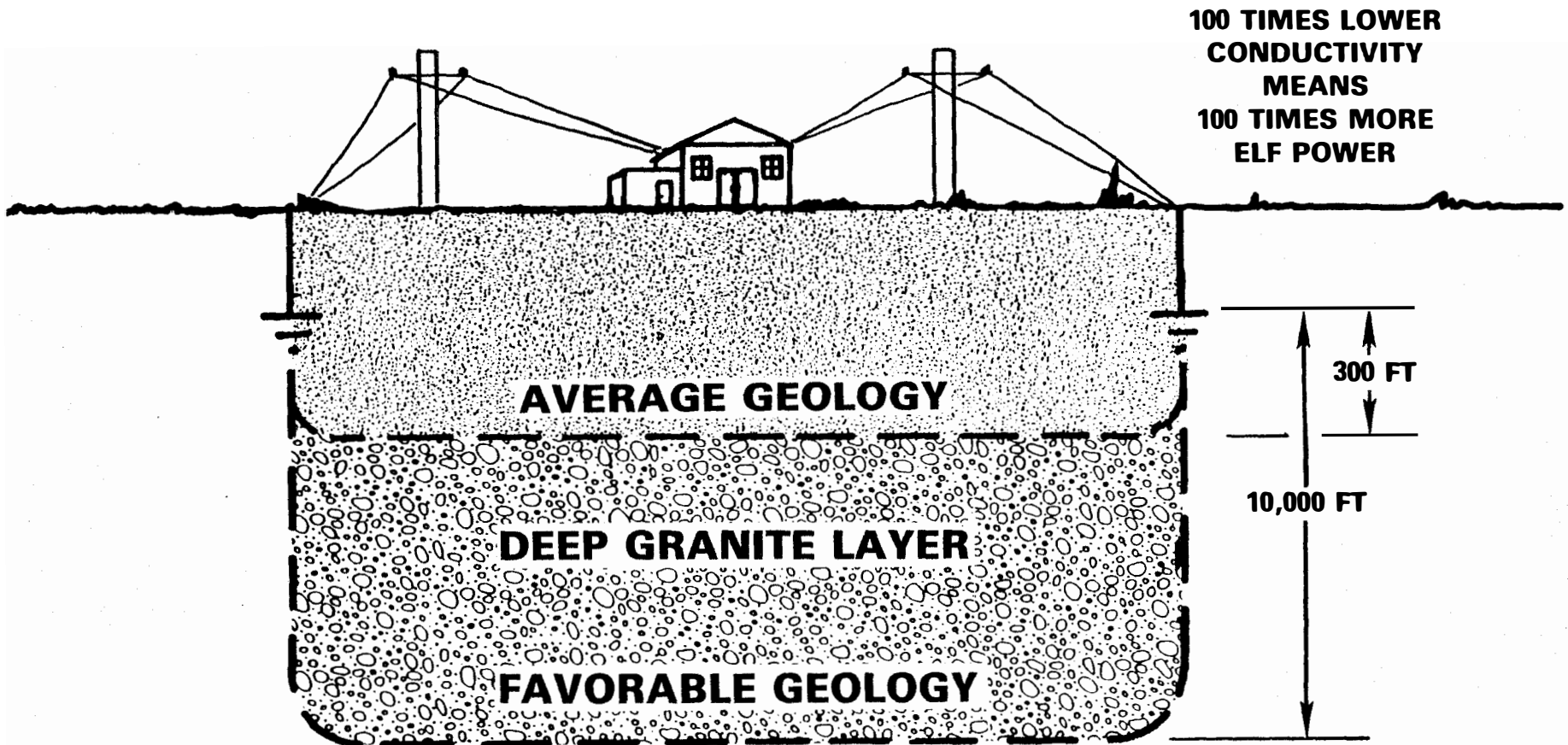
# ELF COMMUNICATIONS SYSTEM OVERVIEW

- **COVERS LARGE GEOGRAPHICAL AREAS**
- **RESISTS**
  - **JAMMING**
  - **NUCLEAR DISTURBANCES**
- **CAN BE RECEIVED AT**
  - **OPERATIONAL DEPTHS**
  - **HIGH SPEEDS**

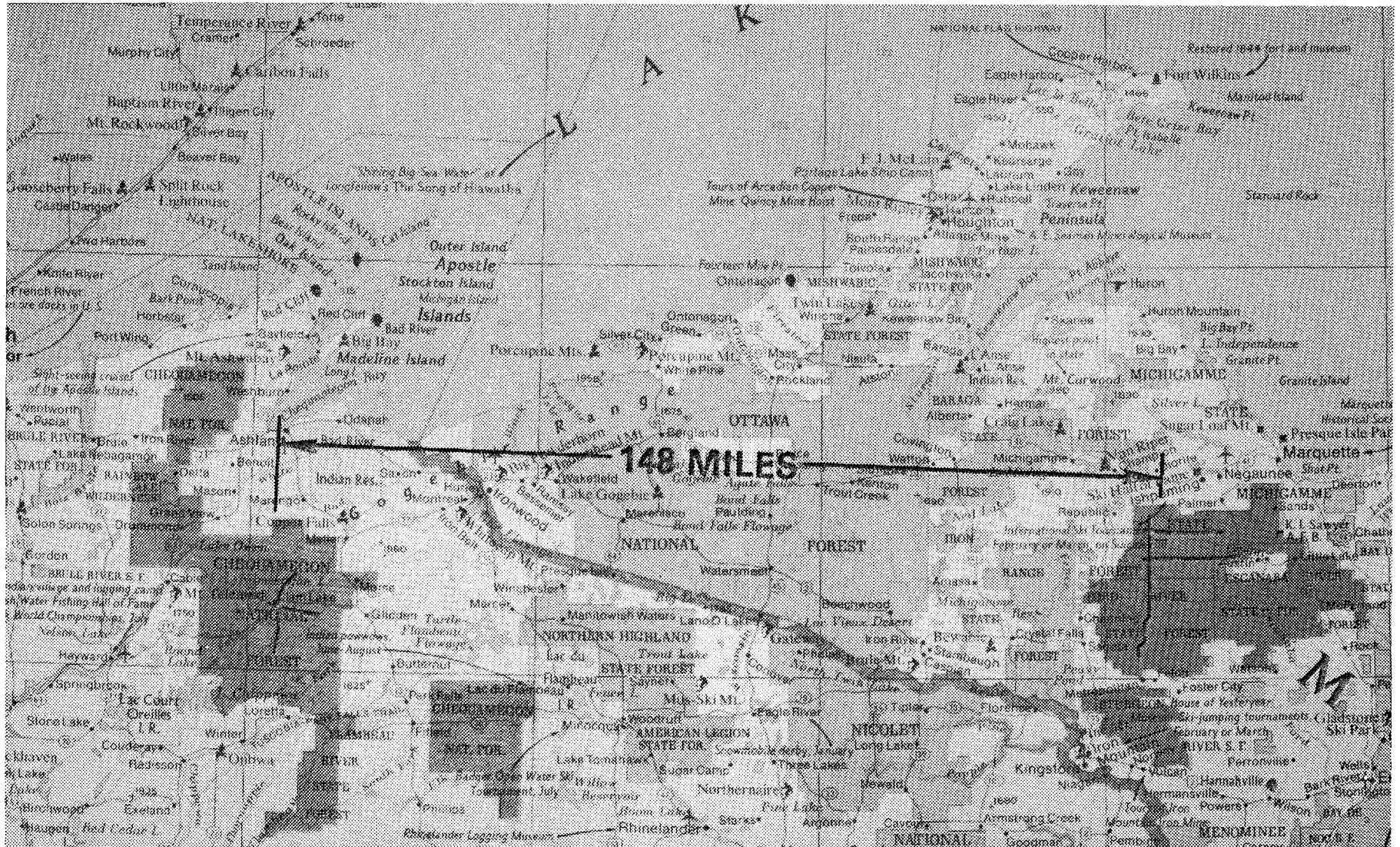
**IONOSPHERE**



# ELF EFFICIENCY VS CONDUCTIVITY

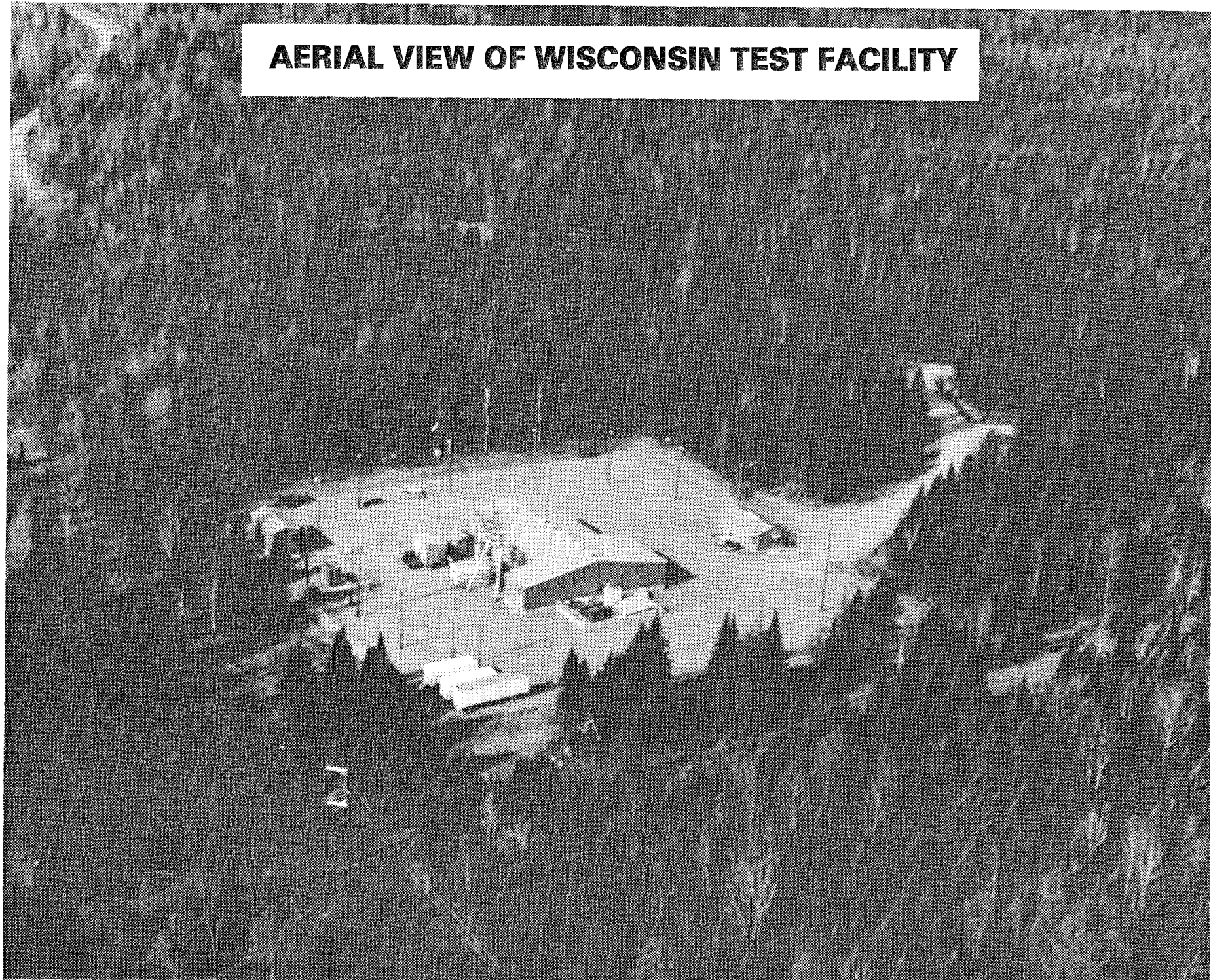


# WISCONSIN/MICHIGAN ELF SITES

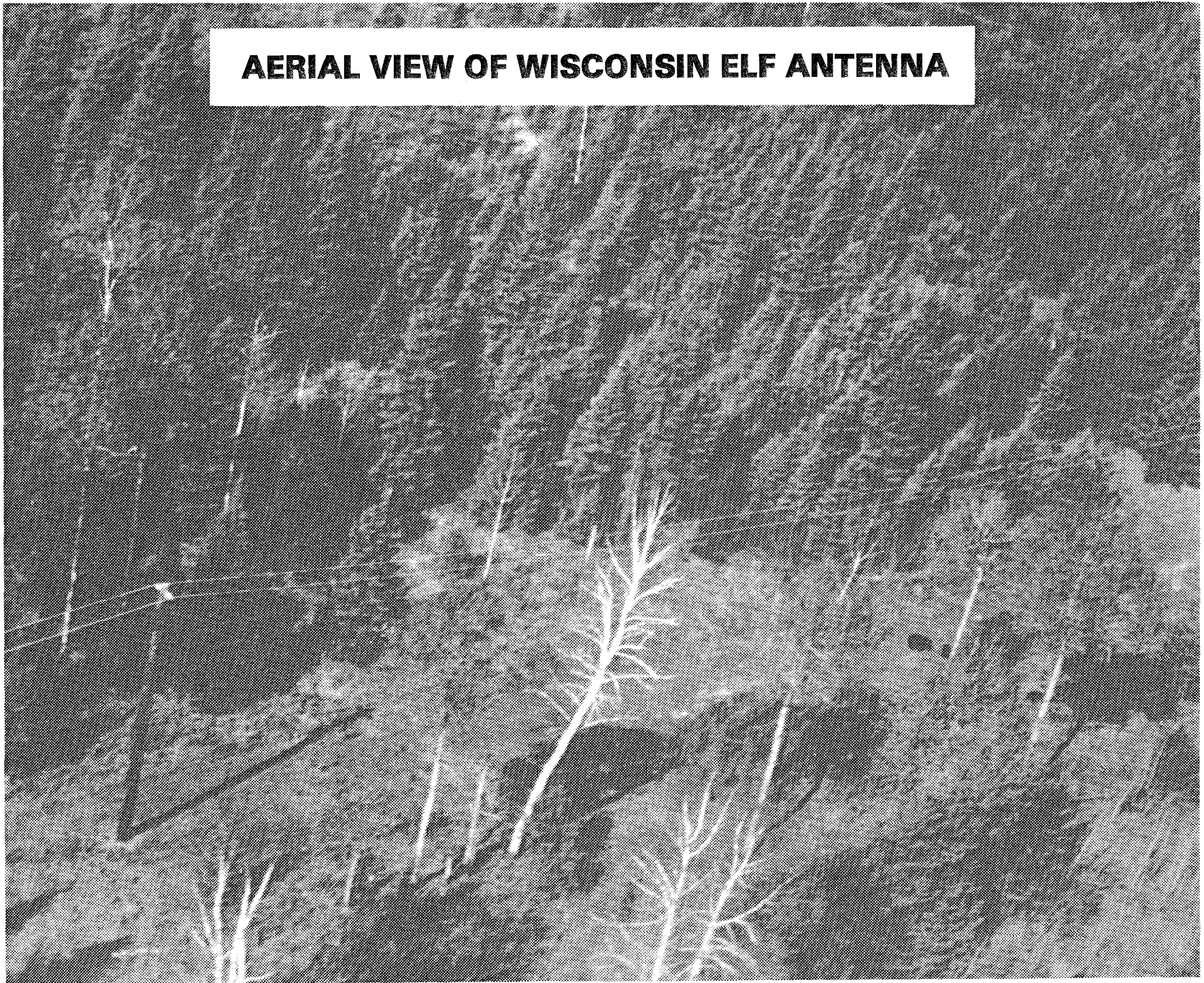




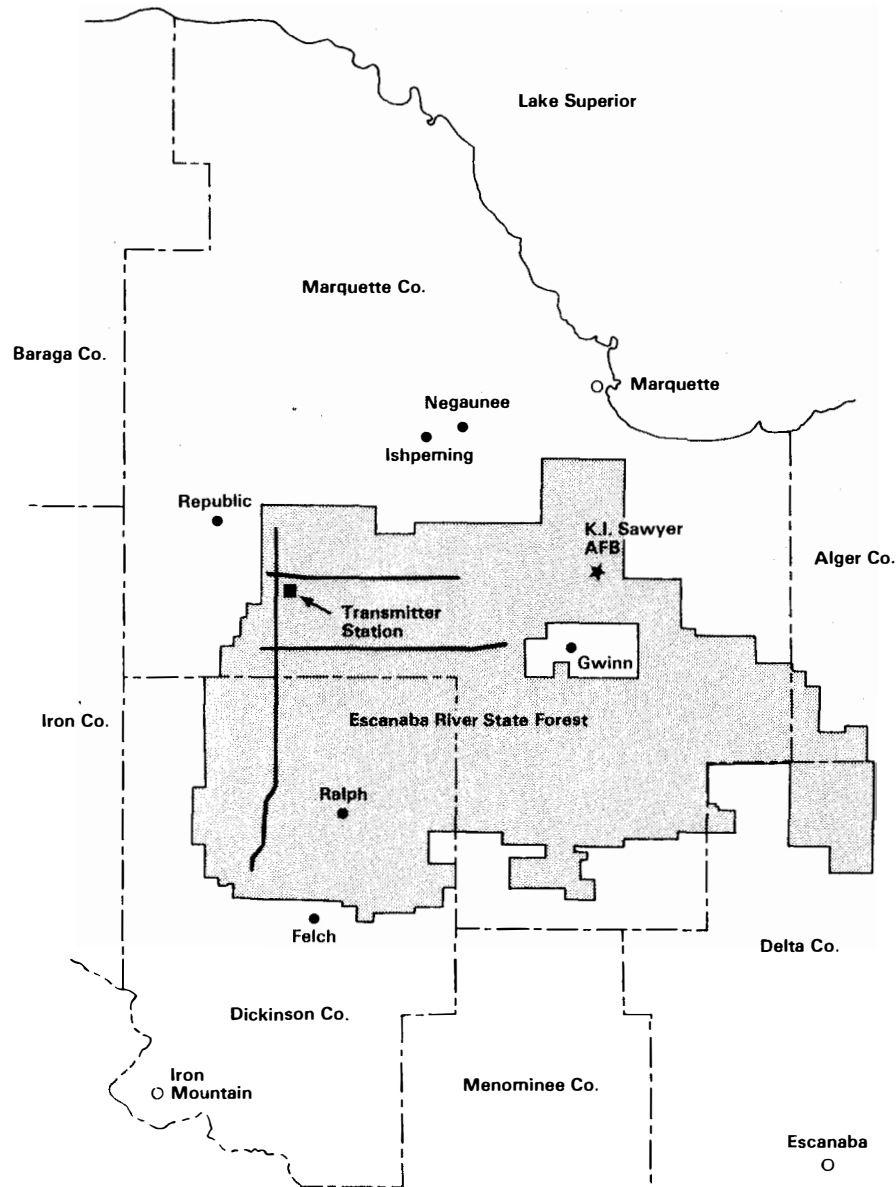
**AERIAL VIEW OF WISCONSIN TEST FACILITY**



**AERIAL VIEW OF WISCONSIN ELF ANTENNA**



# MICHIGAN ELF TRANSMITTING SITE



# **DESCRIPTION**

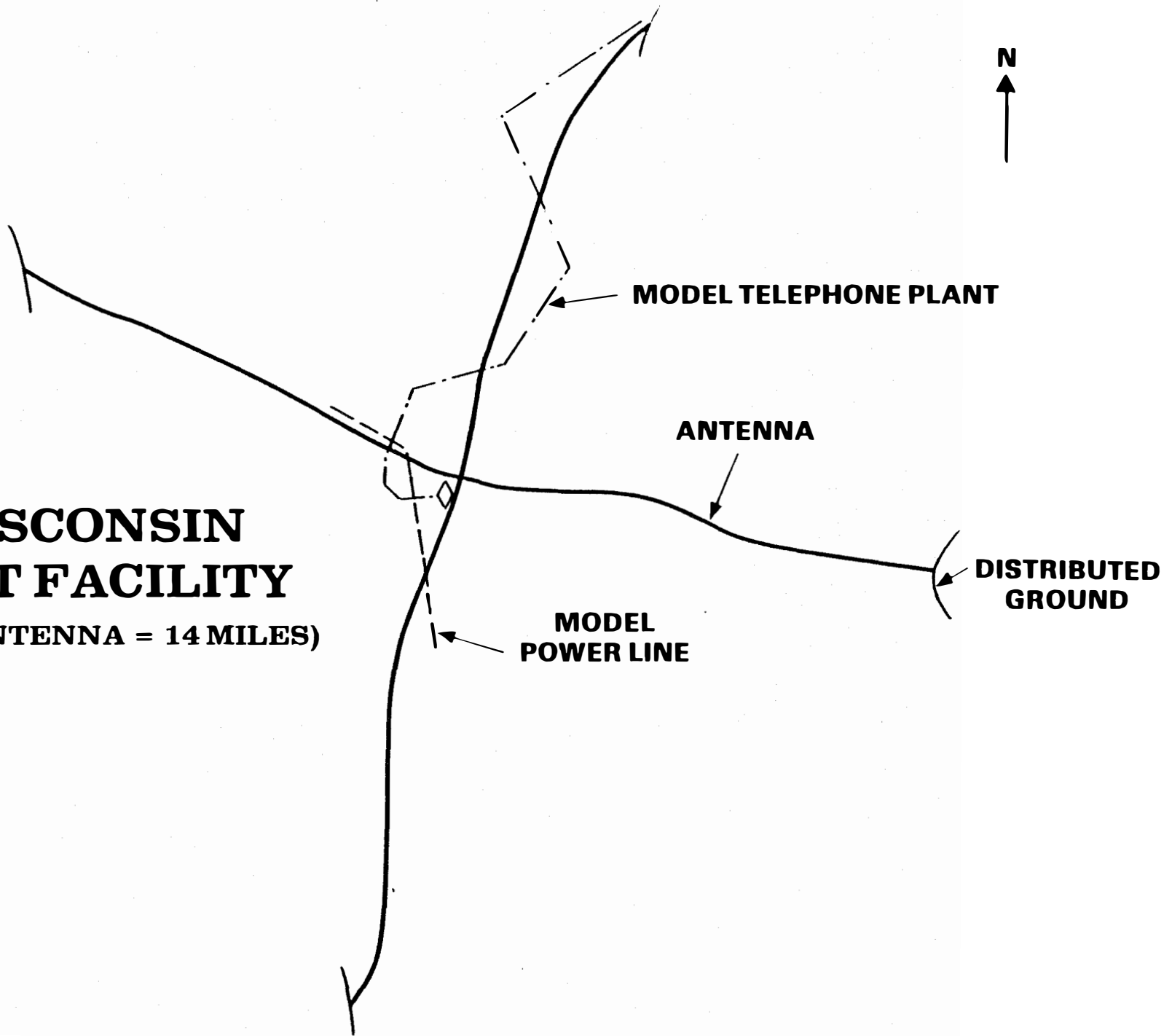
## **WISCONSIN**

- **UPGRADE EXISTING ELECTRONICS**
- **USE EXISTING 28 MILES OF ANTENNA**

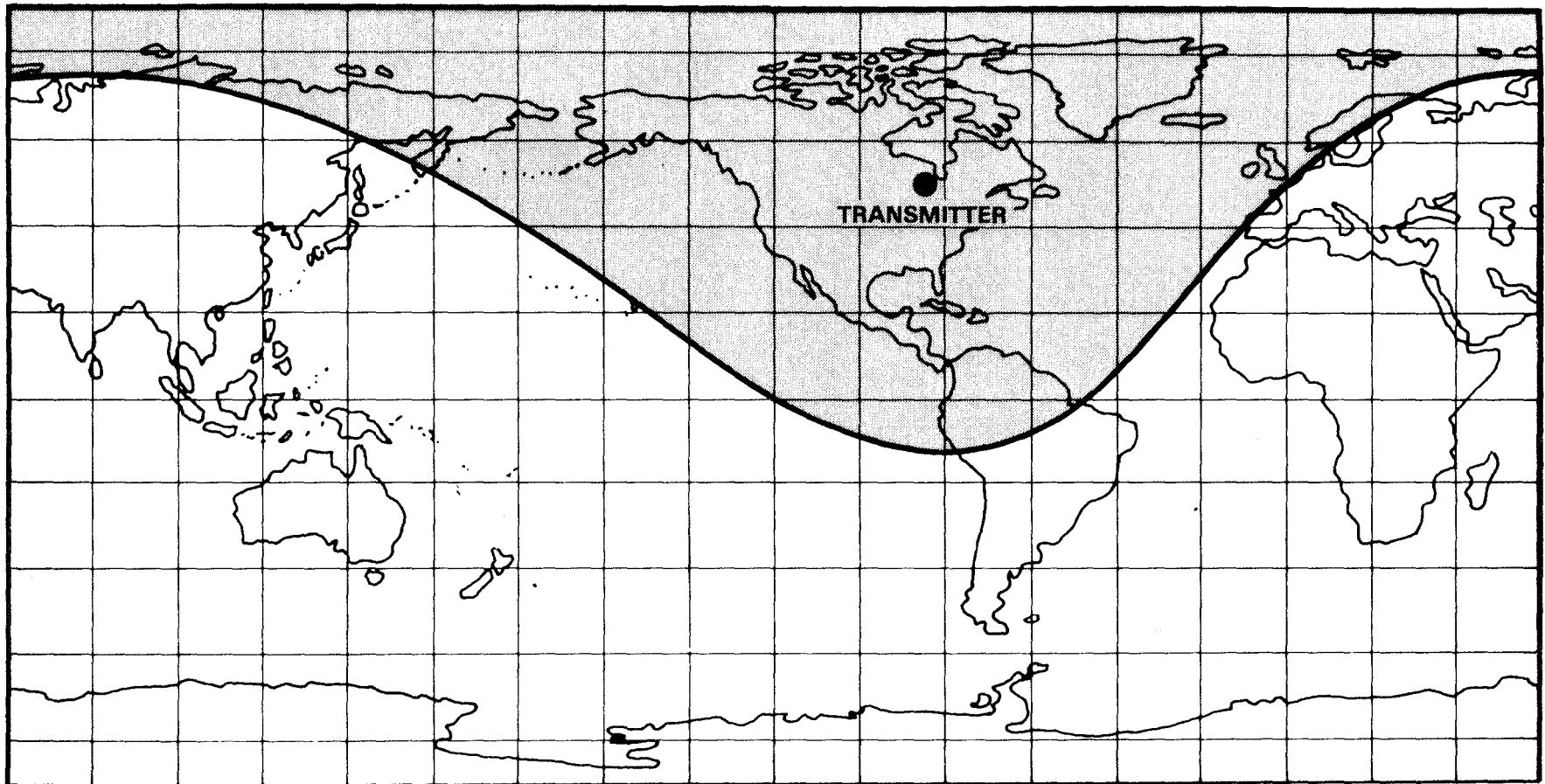
## **MICHIGAN**

- **CONTROL CENTER ON K.I. SAWYER AFB**
- **56 MILES OF ANTENNA**

**WISCONSIN  
TEST FACILITY**  
(EACH ANTENNA = 14 MILES)

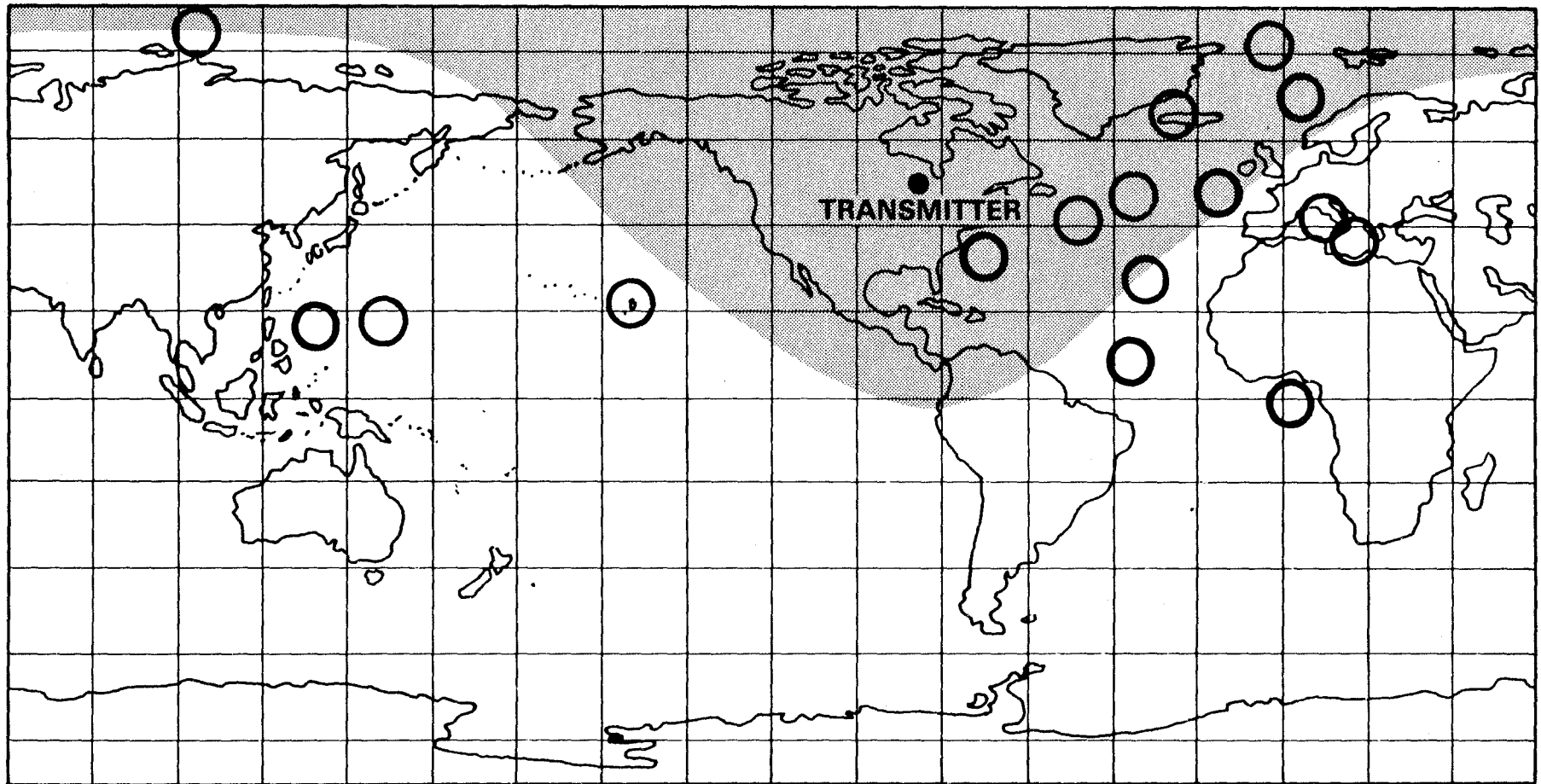


# COMMUNICATIONS COVERAGE COMBINED WISCONSIN AND MICHIGAN ELF SYSTEM



AREA OF RECEPTION

# ELF RECEPTION EXPERIENCE

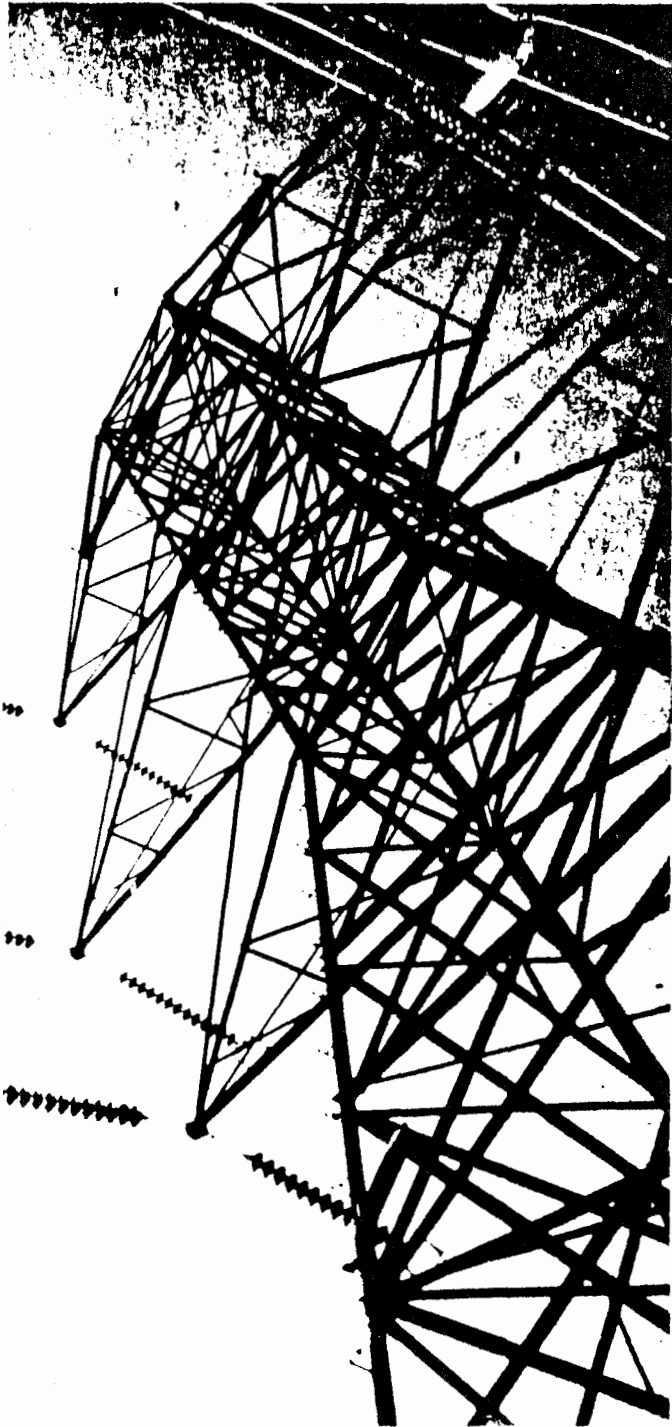


 PREDICTED AREA OF  
RECEPTION FOR WISCONSIN  
TEST FACILITY

# **SITE DEVELOPMENT MILESTONE SCHEDULE**

<b>COMMENCE MICHIGAN SITE SURVEYS</b>	<b>FY 1982</b>
<b>BIO/ECO BASELINE</b>	<b>FY 1982</b>
<b>COMMENCE WTF UPGRADE</b>	<b>FY 1982</b>
<b>COMMENCE CONSTRUCTION — MICHIGAN</b>	<b>FY 1983</b>
<b>INITIAL OPERATIONAL CAPABILITY</b>	<b>FY 1985</b>
<b>COMPLETE MICHIGAN SITE</b>	<b>FY 1986</b>
<b>FULL OPERATIONAL CAPABILITY</b>	<b>FY 1987</b>





# ELECTRIC POWER (IN MEGAWATTS)

	<u>U.P. MICH.</u>	<u>NW WISC.</u>
• PRESENT POWER COMPANY CAPACITIES	915	922
• POWER REQUIRED FOR ELF SYSTEM LESS THAN 0.2% OF PRESENT CAPACITY		

# **CURRENT SYSTEM**

- **EXPERIMENTAL SYSTEM**
- **WTF AND EXPERIMENTAL RECEIVERS**
- **PERIOD OF OPERATION: 1976-1978; 1981-1984**
- **WORLDWIDE RECEPTION**
- **VALIDATED ELF CONCEPT**
  - **TECHNICAL**
  - **OPERATIONAL**

# **DEVELOPMENT OF OPERATIONAL SYSTEM**

- **PRELIMINARY DESIGN COMPLETED**
- **COMPLETE DETAILED DESIGN AND BUILD MILITARIZED PROTOTYPE EQUIPMENT**
- **MODIFY WISCONSIN FACILITY; BUILD MICHIGAN FACILITY**
- **VERIFY PERFORMANCE**
  - **ENVIRONMENTAL COMPATIBILITY**
  - **COMMUNICATION CAPABILITY**
- **PRODUCE AND INSTALL FLEET EQUIPMENT**

# **ENVIRONMENTAL IMPACT STATEMENT CHRONOLOGY**

**FEB 77**

**FILED DRAFT EIS**

**MAR/APR 77**

**PUBLIC HEARINGS**

**SEPT 77**

**SUPPLEMENT - NATIONAL ACADEMY  
REPORT**

**SUPPLEMENT - SYNCHRONOUS  
OPERATION OF  
MICHIGAN AND  
WISCONSIN TEST  
FACILITIES**

**DEC 77**

**FILED FINAL EIS**

# **NATIONAL ACADEMY OF SCIENCES**

## **COMMITTEE ON ELF BIOSPHERE**

**FINAL REPORT 1 AUGUST 1977**

- **CONCERNS ABOUT ENVIRONMENTAL CONTAMINATION ARE INVALID AND UNWARRANTED**
- **REMAINING CONCERNS:**
  - **STEP POTENTIAL AT ANTENNA GROUNDS**
  - **ANTENNA FAULT DETECTION**
- **DESIGN CHANGES IMPLEMENTED OR PLANNED TO ALLEVIATE CONCERNS**



## **BIOLOGICAL/ECOLOGICAL MONITORING**

- **ESTABLISH BASELINE MONITORING PROGRAM IN MICHIGAN AREA**
- **CONTINUE STUDIES IN WISCONSIN**
- **ACCOMPLISH ADDITIONAL STUDIES RECOMMENDED BY NATIONAL ACADEMY OF SCIENCES AND OTHERS, INCLUDING:**
  - **SOIL ANIMALS (e.g., EARTHWORMS)**
  - **TERRESTRIAL HABITAT/AVIAN SPECIES**
  - **AQUATIC HABITAT**
  - **POLLINATING INSECTS & VEGETATION**
  - **MIGRATING BIRDS**
  - **WETLANDS COMMUNITIES**

# ECONOMIC PROJECTION IN WISCONSIN EMPLOYMENT

<ul style="list-style-type: none"> <li>• <b>FACILITY UPGRADE (4 MO):</b>  <ul style="list-style-type: none"> <li><b>AVERAGE: 22</b></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>LOCAL RESIDENT</b></li> <li><b>INDUCED</b></li> <li style="padding-left: 40px;"><b>TOTAL</b></li> </ul>	<ul style="list-style-type: none"> <li><b>16</b></li> <li><b><u>18</u></b></li> <li><b>34</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>T&amp;E (3 MO):</b>  <ul style="list-style-type: none"> <li><b>AVERAGE: 63</b></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>LOCAL RESIDENT</b></li> <li><b>INDUCED</b></li> <li style="padding-left: 40px;"><b>TOTAL</b></li> </ul>	<ul style="list-style-type: none"> <li><b>35</b></li> <li><b><u>28</u></b></li> <li><b>63</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>LONG TERM OPERATIONS:</b></li> </ul>	<ul style="list-style-type: none"> <li><b>MILITARY</b></li> <li><b>CIVILIAN</b></li> <li><b>INDUCED</b></li> <li style="padding-left: 40px;"><b>TOTAL</b></li> </ul>	<ul style="list-style-type: none"> <li><b>7</b></li> <li><b>22</b></li> <li><b><u>42</u></b></li> <li><b>71</b></li> </ul>

**ECONOMIC PROJECTION IN WISCONSIN  
INCOME (\$ MILLION FY 81)**

- **WAGES:**
  - FACILITY UPGRADE (4 MO): \$0.28M**
  - T&E (3 MO): \$0.24M**
  - LONG TERM: \$0.9M ANNUAL**
- **UTILITY RELATED: \$0.5M ANNUAL**
- **REGIONAL COMMERCE:**
  - FACILITY UPGRADE: \$1.7M**
  - LONG TERM : \$0.3M**
  - YIELDS: \$0.01M ANNUAL**

**ANNUAL TOTAL: 1.4M**



# ECONOMIC PROJECTION IN MICHIGAN EMPLOYMENT

- **CONSTRUCTION (6 MO):**

**AVERAGE: 129**

<b>LOCAL RESIDENT</b>	<b>97</b>
<b>INDUCED</b>	<b><u>103</u></b>
<b>TOTAL</b>	<b>200</b>

- **T&E (6 MO):**

**AVERAGE: 229**

<b>LOCAL RESIDENT</b>	<b>127</b>
<b>INDUCED</b>	<b><u>102</u></b>
<b>TOTAL</b>	<b>229</b>

- **LONG TERM OPERATIONS:**

<b>MILITARY</b>	<b>14</b>
<b>CIVILIAN</b>	<b>55</b>
<b>INDUCED</b>	<b><u>90</u></b>
<b>TOTAL</b>	<b>159</b>

**ECONOMIC PROJECTION IN MICHIGAN  
INCOME (\$ MILLION FY 81)**

- **WAGES:**
  - CONSTRUCTION (6 MO): \$2.5M**
  - T&E (6 MO): \$1.7M**
  - LONG TERM: \$1.9M ANNUAL**
- **UTILITY RELATED: \$0.5M ANNUAL**
- **REGIONAL COMMERCE:**
  - CONSTRUCTION: \$14.5M**
  - LONG TERM: \$0.7M**
  - YIELDS: \$0.01M ANNUAL**

**ANNUAL TOTAL: \$2.4M**

SUBMARINES ON PATROL

