

1. Keywords

FPS 33  
FPS 6  
FPS 67  
RADAR

2. Start Date: FY 62 Quarter 1  
End Date: FY 62 Quarter 1

3. HQ Division: 42 - LASER MICROWAVE DIVISION

4. Phase:

5. Program NO:

6. Survey Type:

7. INSTALLATION OR SOURCE OF INFORMATION (CITY & STATE OR  
COUNTY ARE ESSENTIAL)  
FC - USA FORCES COMMAND

8. Authors:

9. ARLOC/Activity: 24571 000 - FORT MEADE  
Location: FORT MEADE  
State: MD

10. Project Control Number: 3994R0226262

11. Document Type: 1

HEADQUARTERS  
U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY  
UNITED STATES ARMY MEDICAL SERVICE

CLASS II ACTIVITY  
OF  
THE SURGEON GENERAL

ARMY CHEMICAL CENTER  
MARYLAND

IN REPLY REFER TO:  
USAEMA-MR

4 JUN 1962

SUBJECT: Report of Radiological Hygiene Survey No. 3994R22-62

TO: The Surgeon General, ATTN: MEDPS-PO, Department of the Army,  
Washington 25, D. C.  
Commanding General, U.S. Army Air Defense Command, ATTN: Surgeon,  
Ent Air Force Base, Colorado Springs, Colorado  
→ Commanding General, First Region, U.S. Army Air Defense Command,  
ATTN: Surgeon, Fort Totten, Flushing 59, New York  
Commanding General, 35th Artillery Brigade, Fort George G. Meade,  
Maryland  
IN TURN

Transmitted herewith is Report of Radiological Hygiene Survey conducted at 35th Artillery Brigade, Fort George G. Meade, Maryland, during the periods 6-10 and 20-21 November 1961, by Mr. William A. Palmisano, Electronics Engineer, of this Agency. This report includes findings of the survey, observations based on these findings, and recommendations of this Agency with respect to certain of these findings.

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as

*Charles W. Kraul*  
CHARLES W. KRAUL  
Lt Colonel, MC  
Commanding

3994R22-62  
COMPLETED  
4 June 1962

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Jem  
FILE

HEADQUARTERS  
U S ARMY ENVIRONMENTAL HYGIENE AGENCY  
UNITED STATES ARMY MEDICAL SERVICE

CLASSIFICATION  
OF  
THE SURGEON GENERAL

ARMY CHEMICAL CENTER  
MARYLAND

USAENA-MR

4 JUN 1962

REPORT OF RADIOLOGICAL HYGIENE SURVEY NO. 3994R22-62  
MISSILE MASTER  
35TH ARTILLERY BRIGADE  
FORT GEORGE G. MEADE, MARYLAND  
6-10, 20-21 NOVEMBER 1961

1. AUTHORITY.

a. AR 40-557, par 13.

b. Letter, MEDEI-R, U.S. Army Environmental Hygiene Agency, thru The Surgeon General, to Commanding General, U.S. Army Air Defense Command, Ent Air Force Base, Colorado Springs, Colorado, dated 25 February 1961, subject: "Radiological Hygiene Surveys of Nike Missile Operations", and endorsements thereto.

2. PURPOSE. The purpose of this survey was to accomplish the following objectives:

a. To evaluate the radiation exposure to persons operating, and to those remaining in the vicinity of, the microwave radiation facilities at Missile Master, 35th Artillery Brigade, Fort George G. Meade, Maryland.

b. To make such recommendations as are necessary to protect personnel from needless exposure to microwave radiation.

3. STANDARDS. The publication which has been used as a guide in determining the adequacy of the microwave radiation protection facilities and program is as follows: AR 40-583, "Control of Potential Hazards to Health from Microwave Energy", dated 12 July 1961.

4. INSTRUMENTATION. The following microwave and ionizing radiation detection instruments were used:

a. Ramcor Model 1200 Densimeter.

b. Empire Power Density Meter, Model NF-157.

c. Eberline Model E-112B Survey Meter.

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5. FINDINGS.

a. The Missile Master complex consisted of two AN/FPS-6 (Air Force), one AN/FPS-67 (Air Force), two AN/FPS-6 (Signal Corps), and one AN/FPS-33 (Martin Co.) radar sets.

b. Power density levels were measured at all locations which are normally occupied by Army personnel.\* Locations which are occupied by Air Force personnel were not measured, but results of a survey made by the Air Force Radiation Team at these locations are listed in Appendix, page 6.

c. Operating parameters of AN/FPS-6's are listed in Appendix, page 7.

d. For site layout and locations of possible occupied areas where measurements were made, see Appendix, Plate R-357, page 4.

e. Power density levels measured at these locations are listed in Appendix, page 5.

f. Comments, specific deficiencies, and potential hazards, listed by sets, are as follows:

(1) Set No. I (AN/FPS-6). The only potentially hazardous area at this location would be to maintenance personnel working on the antenna with set No. V radiating with its antenna stationary and at  $-2^{\circ}$  elevation.

(2) Set No. II (AN/FPS-33).

(a) Because the radome area of this set is higher in elevation than that of the four AN/FPS-6's, this area is the most hazardous.

(b) Power densities measured from all sources exceed  $10 \text{ mw/cm}^2$  at certain locations.

(c) Power densities above  $80 \text{ mw/cm}^2$  could exist in the radome area if all four AN/FPS-6's were pointed in this direction.

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\* Measurements were made at each location with the antenna of the source radar stationary in both azimuth and elevation. The elevation angle of the source antenna was so set as to position the main beam axis at the point of measurement where possible. In cases where the source antenna was high enough above the measurement point so that power density in the beam axis could not be measured, the source antenna was set to minimum elevation ( $-2^{\circ}$ ).

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(d) The entire second floor of this tower is screened with copper mesh except for a door facing set No. IV. Power densities of  $15 \text{ mw/cm}^2$  with the door closed were measured at the operator's desk when set No. IV was beamed in this direction.

(e) As the radome of this set has no observation windows or ports, personnel working in this area would not be able to observe the antenna position of the other radar sets.

(3) Set No. III (AN/FPS-6). Potentially hazardous levels could be encountered by maintenance personnel working on the antenna when this area is radiated by set No. IV.

(4) Other Areas

(a) Measurements made at various other occupied areas, inside buildings, and surrounding area at ground level showed no measurable RF radiation.

(b) Ionizing radiation measurements taken to ascertain the levels of x-radiation from the magnetrons QK 338 showed no levels above .7 mr/hr with transmitter cabinet open.

6. RECOMMENDATIONS.

a. Set No. I (AN/FPS-6). When maintenance personnel are required to work on the antenna of this set, arrangements should be made with Air Force personnel operating set No. V not to radiate in this direction during the period of maintenance.

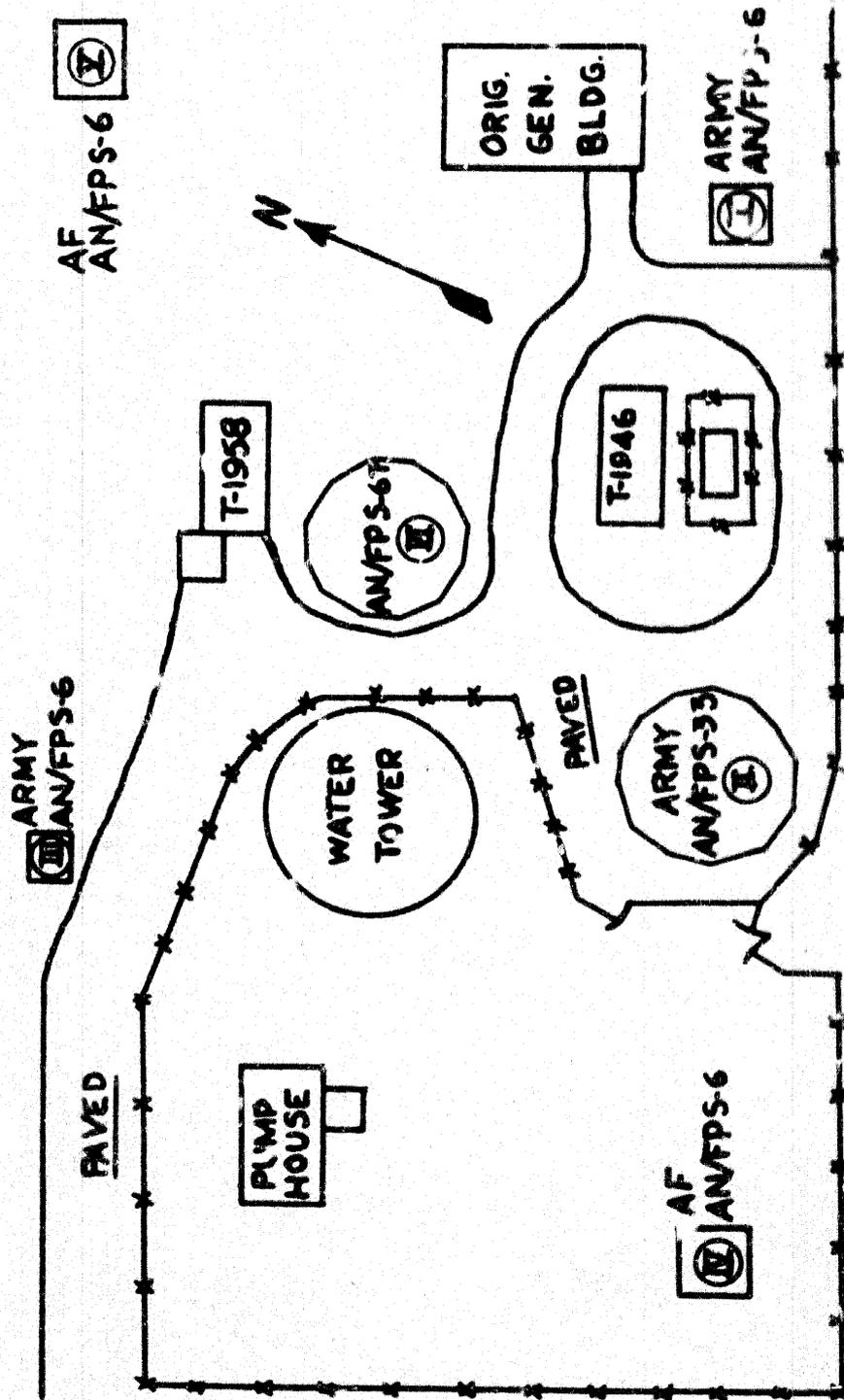
b. Set No. II (AN/FPS-33). The following methods are suggested as a means of alleviating the potential hazards in this area:

(1) The use of sector blanking at the AN/FPS-6's to blank out these sets at headings which would cause the AN/FPS-33 to be radiated or the posting of signs at the AN/FPS-6 consoles delineating the antenna azimuth at which the AN/FPS-33 would be radiated and not allowing the AN/FPS-6's to radiate these areas with their antennas stationary.

(2) The door on the second floor of the AN/FPS-33 tower should be covered with two layers of copper screen, preferably one on each side of the door.

c. Set No. III (AN/FPS-6). When maintenance personnel are required to work on the antenna of this set, arrangements should be made with Air Force personnel operating set No. IV not to radiate in this direction during the period of maintenance.

APPENDIX



Report of Radiological Hygiene Survey No. 3994R22-62  
 Missile Master, 35th Artillery Brigade, Fort George  
 G. Meade, Maryland

**U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY**  
 UNITED STATES ARMY MEDICAL SERVICE

DATE 6-10 Nov 61  
 DRAWN WAP  
 APPROVED RSP  
 SCALE None  
 PLATE R-857

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APPENDIX

POWER DENSITY MEASUREMENTS

SOURCE	POWER DENSITY (mw/cm <sup>2</sup> )	DISTANCE	REMARKS
LOCATION - SET I (Army AN/FPS-6)			
II	0	160'	FPS-33 not operational
III	0	272'	Blocked by FPS-67 tower
IV	0	300'	Blocked by FPS-33 tower
V	2.4	180'	At catwalk 30' above ground
V	21.2	180'	At antenna 45' above ground
LOCATION - SET II (AN/FPS-3?)			
I	2.6	160'	Catwalk 34' above ground
I	30.0	160'	Inside radome 5' above floor
III	17.2	190'	On catwalk
III	9.0	190'	On catwalk (reflection from water tank)
IV	22.0	140'	On catwalk
IV	20.0	146'	Inside 2d floor of tower (door open)
IV	15.9	146'	Inside 2d floor of tower (door closed)
IV	40.0	140'	Inside radome 5' above floor
V	2.0	260'	On catwalk 30' above ground
V	12.5	260'	Inside radome 5' above floor
LOCATION - SET III (Army AN/FPS-6)			
I	0	272'	Blocked by FPS-67 tower
II	0	185'	Not operational
IV	2.0	225'	On catwalk
IV	19.5	225'	At antenna 40' above ground
V	2.2	220'	On catwalk
V	9.5	220'	At antenna 40' above ground

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APPENDIX (CONT'D)

AIR FORCE POWER DENSITY MEASUREMENTS

LOCATION	SOURCE	POWER DENSITY (mw/cm <sup>2</sup> )	DISTANCE	REMARKS
IV	I	0	300'	30' above ground
IV	III	7.0	220'	32' above ground
V	V	3.5	180'	45' above ground
V	III	3.0	220'	49' above ground
V	III	7.0	220'	53' above ground
VI	I	10.0	140'	40' above ground
VI	I	25.0	140'	42' above ground
VI	III	10.0	120'	32' above ground
VI	III	27.0	120'	35' above ground
VI	IV	10.0	260'	32' above ground
VI	IV	24.8	260'	35' above ground
VI	V	10.0	150'	32' above ground
VI	V	38.0	150'	36' above ground

APPENDIX

OPERATING PARAMETERS OF AN/FPS-6

Peak power	5 megawatts
Average power	3.6 kilowatts
Pulse repetition frequency	360 pulse/second
Pulse width	2 microseconds
Antenna size	30' x 7½'
Antenna gain	38.5 db
Beam width (horizontal)	3.2°
Beam width (vertical)	.85°
Nod rate	20-30 nods/minute
Vertical scan	-2° to +32°
Frequency	S Band

At the time of the survey the two Air Force AN/FPS-6's were operating at an average power of 3.2 kilowatts and the two Army AN/FPS-6's were operating at an average power of 2.9 kilowatts.

The calculated distance to which power densities of 10 mw or greater would exist in the beam axis for the Air Force AN/FPS-6's is 437' and for the Army AN/FPS-6's is 423'.