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A.
Seen by Mr
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27 SEP 1967

TO: UNCLASSIFIED

For: Director, DARPA / TIO
5 - DEC 1977

MEMORANDUM FOR DIRECTOR, DEFENSE RESEARCH & ENGINEERING

SUBJECT: Project BIZARRE

- References:
1. Memorandum to Director, ARPA, from Deputy Director, Advanced Sensors, dated 15 December 1966, subject: Project PANDORA - Initial Test Results. (Top Secret)
 2. Memorandum for Record, signed by Deputy Director, Advanced Sensors, dated 20 December 1967, subject: Project PANDORA - Initial Test Results. (Top Secret)
 3. Memorandum for Director, R&E, from Deputy Director, Advanced Sensors, dated 28 June 1967, concerning Projects PANDORA and BIZARRE. (Top Secret)
 4. CIA Memorandum for Deputy Director, R&D, dated 13 September 1967, subject: Summary of TUMS Power Density Measurements - 13 September 1967. (Secret)
 5. Memorandum from AF Avionics Laboratory to Mr. Cesaro, dated 15 August 1967, subject: Power Level Measurements - TUMS Radiation. (Secret)

SUMMARY

1. The central nervous system of primates has been penetrated directly or indirectly by non-thermal modulated microwave radiation at power density levels from 4.0 milliwatts per square centimeter down to 1.0 mw/cm² (these levels are below present U. S. safety standards).

2. At similar radiation power densities and non-modulated low microwave radiation the primates performed normally.

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3. The recent low level BIZARRE tests at .008, .05, .01 mw/cm² power densities under modulated microwave radiation did not cause the primate to degrade in conducting his work tasks.

4. The latest data collected on the Moscow data indicates energy densities no greater than .05 mw/cm² in the Moscow Signal

DISCUSSION

This memorandum is a progress report on Project BIZARRE. References 1, 2, and 3 report in detail on the ARPA experimental results of primate tests in Project BIZARRE and related research and development. The tests so far have established that the central nervous system of primates was disrupted directly or indirectly after exposure to low level (non-thermal) 4-5 mw/cm² modulated "S" band microwave radiation for periods between 10 and 19 days. When the primate tests were conducted at the same low level (4-5 mw/cm²) radiation, without modulation, the central nervous system was not disrupted for test periods up to 30 days as reflected by overt performance measurements (references 1 and 2). The electromagnetic frequency and modulation used for these preliminary tests simulated a portion of the "Moscow Signal." The intent of the "Moscow Signal" has not been established by the experiments conducted to date.

New measurements with ARPA instrumentation of the "Moscow Signal" on site has now been completed. These data of the "Moscow Signal" cover a recorded bandwidth of 50 mc as opposed to the original bandwidth data recordings of 3 mc. Also, a partial mapping of the power density has been completed (references 4 and 5). A thorough analysis of this new signal data should now be undertaken to define the "Moscow Signal" characteristics. No further "on-site" electromagnetic measurements *seem to be* ~~are~~ required.

The latest data on power levels recorded in the Moscow Embassy were always below 50 microwatts/cm² (.05 mw/cm²). The recent BIZARRE tests have completed one experiment on primate behavior at power levels of .008, .05, .01, and 4.6 mw/cm². These data showed no overt primate performance degradation at levels below 1.0 mw/cm². It must be emphasized that these initial investigations were only concerned with

the overt primate performance measurement. Information on other biological indicators such as EEG, EKG, genitic effects, anatomical abnormalities, neuro chemistries, or sophisticated blood chemistries (endocrine, steroid levels, chromosomal abberations, etc.) will be obtained in the next program phase of BIZARRE.

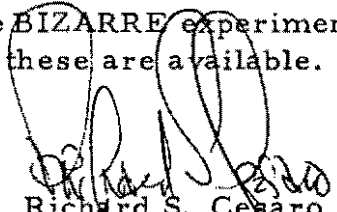
The Soviets have reported in the open literature that humans subjected to low level (non-thermal) modulated microwave radiation, show adverse clinical and physiological effects. The experiments with modulated microwaves on primates conducted by ARPA show repeatable histories of measured degradation of primate performance under laboratory conditions. In the United States there have been no experiments with microwaves which directly relate primate performance with human behavior. In certain other types of experimental medicine (e. g. , blood chemistry, drug screening, etc.) effects which show up on Rhesus monkeys bear a strong relationship to effects observed in humans. The ARPA BIZARRE program will establish methods which should permit us to relate the behavior of sub-human primates to man under conditions of microwave exposure. This may require direct testing with humans under controlled conditions.

Serious impact of this research centers around the following general considerations:

1. Hazards to humans from low level microwave radiation may exist below the present U. S. safety limits. These hazards must be carefully explored and established. Latent, long term effects on biological systems must be investigated.

2. The ARPA test results have demonstrated the feasibility of causing adverse biological effects on the central nervous system of primates. The potential of exerting a degree of control on human behavior by low level selectively modulated microwave radiation should be investigated for potential weapon applications.

Significant results obtained from the BIZARRE experimental effort will be periodically reported as soon as these are available.


Richard S. Cevaro
Acting Director
Advanced Sensors