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August 16, 1971

*Tracy follows -
This is an
we classified report on
Zaret work added to
this file for reference
St. John*

Mr. Harry Sonnemann
Special Assistant to the
Assistant Secretary of the Navy (R&D)
Department of the Navy
The Pentagon, Room 4D745
Washington, D.C. 20350

Subject: Review of Contract N00014-69-C-0358
"Radio-Frequency Hazards"
Principal Investigator: Dr. Milton M. Zaret

Dear Harry:

An ad-hoc committee consisting of the undersigned was established at your request to review the above contract: in particular, "to establish whether the procedures being employed to investigate the potential hazard of low-level microwave radiation are adequate. . . . The issue is whether the techniques employed will result in scientifically credible data from which pertinent clues with respect to the formation of cataracts can be extracted with assurance that the data base is valid." This is a summary of the committee's findings.

It is important to recognize at the outset that this contract consists of two separate studies. The first study is being conducted at the Zaret Foundation primate facility on Laysan Island in Pearl Harbor and involves Dr. M. M. Zaret (who was not resident at the site) and Dr. W. F. Lyons assisted by Miss S. B. Robinson. This experiment is directed primarily toward long-term, low-level chronic exposure of primates. The second study is being conducted at the Polytechnic Institute of Brooklyn by Professor Saul W. Rosenthal and Dr. Ira T. Kaplan (of the Zaret Foundation) assisted by Mr. Leo Birenbaum (P.I.B.) with consultation from Dr. Zaret. This consists of laboratory measurements of heart rate, respiration rate, and sub-cutaneous temperature of rabbits exposed to CW 2450 MHz microwave energy.

According to Dr. Zaret's statement, approximately 10 percent of the funds were expended in the second study.

It is clear that the intent of your letter primarily was to review the Hawaii study.

I. General Findings

It is the general opinion of the committee that:

A. Long-term, low-level exposure of primates to microwave is a worthwhile and necessary experimental effort.

B. The principal study in concept and execution has not utilized adequate techniques or proper scientific methodology and will not result in scientifically credible data. The performance to date is such that it is doubtful whether valid research on this problem would be performed in the future by the same personnel using the same or another approach.

C. It is concluded that the second experiment at Brooklyn has employed adequate techniques and can supply useful contributions to the scientific literature. Continued work could lead to additional useful research.

D. It must be pointed out that the Navy shares responsibility for the poor showing in the principal experimental effort. According to Dr. Zaret, and evident from the course of the experiment, the Navy clearly did not supply a source of adequate intensity to properly carry out the experiment, and it is the opinion of the committee that inept and casual management was demonstrated by the Navy organization involved in controlling the course of the study. Further, both Dr. Zaret and the Navy organizations involved did not adequately either estimate the cost or the planning necessary for proper utilization of a large number of expensive animals for this type of experiment. Nor was there adequate utilization of the basic experimental capability for other physiological, biochemical or behavioral measurements. It is also questionable whether data on only two animals per point could provide credible extrapolation to man in a matter of this level of significance. In summary, the experiment was badly underestimated in both technical complexity and funding.

The specific findings of the committee in the principal experiment follow:

I. Experimental Procedures

These were generally inadequate for studying the effects of low-level radiation in animals.

A. Animal Handling:

1. Animal care was not in accordance with good laboratory practice.
2. Animal restraint procedures during exposures were poor. Examination of the data log indicated that of five monkeys' deaths, three were certainly due to strangulation resulting from poor experimental design of the restraint system. Leaving animals on their perches overnight is poor practice and was probably contributory to some of the deaths.
3. No satisfactory evidence was presented of provision for routine pre- and post-experimental examination of the animals.

B. Microwave Calibration and Measurement Techniques:

1. While the instruments used were calibrated by Dr. Rosenthal (P.I.B.), he never himself visited the site nor participated in on-site measurements.
2. No satisfactory measurements were presented for the exposure fields. The only data shown seemed vague, casual and amateurish.
3. There was no measurement or logging of the radiation data during exposure periods.
4. The problem of artifacts in measuring microwave fields in the presence of metallic collars, support pipes and the presence of dielectrics of unknown properties was not analyzed or documented. There is no evidence that variations due to the presence or absence of the animals in various constraining systems were measured or recorded.

C. Observations were poorly recorded. The data books gave no details of factual observations. Pre-experimental, experimental, and post-experimental records on the exposed and controlled animals were incomplete. Necropsy records did not indicate gross or microscopic findings.

D. There is no evidence of any adequate biochemical or physiological control procedures of even a routine nature that should be intrinsic to an experiment of this type.

II. Scientific Management and Planning

A. The microwave field intensity levels used were a factor of 5 less than the proposed level, and as such did not overlap exposure intensity levels known to produce cataracts. As mentioned above, the Navy shared responsibility in not providing equipment adequate for performing the intended experiment.

B. There is a substantial question as to whether Dr. Lyons and Miss Robinson had adequate training or experience to carry out the microwave experiments without considerably more supervision than indicated. Notations in the log appear to be those of inexperienced, non-technically trained individuals.

C. No information was presented of adequate laboratory or other support facilities available to a program of this magnitude.

D. It is difficult to understand why radiations ceased February 1971 when personnel were still on the site, and the primate colony, equipment, and site were available, particularly after funding was made available until June.

E. It did not appear to the committee that Dr. Zaret was adequately familiar with, or had exercised a careful review function on, the data during or since the exposure.

III. Results

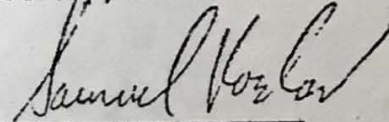
At the conclusion of the radiation, only one primate had over 1,000 hours at 20 mw/cm² and only one other had 1,000 hours at 10 mw/cm². No observations of cataracts were reported. They were not necessarily anticipated for these exposures.

No material has been presented to date which is scientifically credible and which could result in scientific publication. In fact, it appears that no technical report of any degree of detail has been presented relative to work on this portion of the contract.

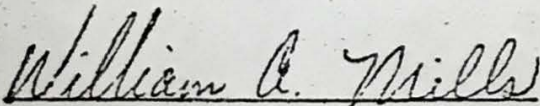
August 16, 1971

We wish to express our appreciation for the opportunity to assist the Department of the Navy in this matter. Please let us know if any additional information is required.

Sincerely,



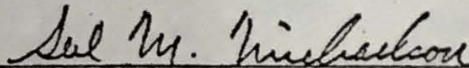
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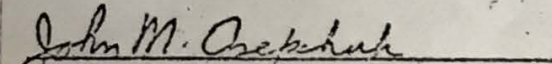
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