

29 March 1949

SUBJECT: Request for Analysis

COPY

TO: Commanding Officer  
3160th Electronics Station  
Cambridge Field Station  
Cambridge, Massachusetts  
ATTN: Base Directorate for Geophysical Research

1. Attached document has been forwarded from Technical Intelligence Department for the purpose of determining, if possible, an explanation for the reported phenomenon.

BY COMMAND OF GENERAL MONARNEY:

GORDON A. BLAKE  
Colonel, USAF  
Chief, Electronic Operations  
Electronic Subdivision  
Engineering Division

1 Incl:  
Intelligence Report

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1st Ind

ERHM

PHW/mc

Hq 3160 Electronics Station, CFS, 230 Albany St., Cambridge 39,  
Mass. 29 April 1949

TO: CG, AMC, Wright-Patterson AFB, Dayton 2, Ohio.  
ATTN: Major R. L. Moore - MCEEO

1. In reference to the phenomenon reported in subject letter, no glow of the size described has ever been reported previously to the knowledge of the scientific personnel of this Directorate at such low altitude. Due to the auroral activity in the area at the time it is natural to assume that the phenomenon is in some way related to the aurora, however the fact that this has been observed on the surface of the water rather than high in the atmosphere is

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difficult to explain. The orange color seems to indicate an excited state of oxygen, however, with the small mean free path which exists at the earth's surface, a terrific electrostatic field would be required which is not likely. If such a field existed due to some freak condition, static charges should have been noted by the B-29 personnel when approaching the glow. This would have produced corona from propeller tips and wing tips which should have interfered with radio communication.

2. At the present time no nuclear reaction is known to the personnel of this Directorate which would produce ionizing particles of sufficient energy to excite the oxygen line in such a manner. The highest decay energy known is that resulting from nuclear fission of  $U^{235}$  and  $Pu^{239}$  which is in the neighborhood of 200 MEV. It is estimated that several thousand MEV should be required to produce this effect, and to date this has only been observed in cosmic rays which are not sufficiently dense enough nor localized enough to produce the effect. Even a controlled rate of fission would liberate heat which should have been readily detectable by the crew of the B-29 through heat radiation effects.

3. The two white "searchlight" beams seems to indicate higher excitation states of oxygen, nitrogen, and other atmospheric elements which are apparently in the zones of maximum potential gradient. It would be natural to assume that there is a possibility of the effect being man made, however again the voltage required to produce a discharge between two antenna masts of a surface craft should cause breakdown of the air rather than a glow discharge at atmospheric pressure. There is a possibility of exciting the gyro-magnetic frequency of electrons in the earth's magnetic field which should not be overlooked. By establishing a strong electromagnetic field at approximately 1.5 mega cycles, and using the earth's magnetic field, in much the same manner as a cyclotron magnet, it is theoretically possible to establish electron orbits in the atmosphere which would accelerate the electrons to the point where ionization of the air (and consequently glow) would take place. This has been proposed as a means of exciting the upper atmosphere on high altitude rocket flights in order to obtain atmospheric composition by spectrographic plates. The possibility of doing this at sea level pressure has not been considered to be possible, however, due to the short mean free path of the electrons at low altitude.

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4. The fact that various atmospheric gases have absorption bands in the microwave region is also well known, but no known cases have been reported of exciting such molecules to the point of ionization at sea level pressures. Hydrogen in water has been resonated at relatively low frequencies due to their magnetic moment, however, a magnetic field of several thousand gauss is required for resonance.

5. In conclusion, no valid explanation, either natural or man made, can be found for a logical explanation of this phenomenon. A copy of the sketch and descriptive material will be placed on file in this Directorate in the hope that some valid explanation or further observation may be found.

FOR THE COMMANDING OFFICER:

1 Incl  
n/c

P. H. WICKOFF  
Chief, Atmospheric Physics Laboratory  
Base Directorate for Geophysical Research