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19 October 1983

Proposal for Research  
SRI International No. ESU 83-147

GEOPHYSICAL FACTORS/ELF/RV CORRELATION STUDY (U)

Part One--Technical Proposal

Prepared for:  
Client Private

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I INTRODUCTION (U)

(S/CL-3/NOFORN) In response to discussions with INSCOM personnel on 7 and 8 September 1983, SRI International submits this proposal to initiate activity concerning a study of potential correlation between RV performance and ambient ELF/geophysical activity.

(S/CL-1/NOFORN) To accomplish the proposed program, SRI will provide the facilities, materials, SRI staffing, and consultants to perform the tasking outlined in the following section.

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## II STATEMENT OF WORK (U)

## 1. (U) GENERAL

1.1 (S/CL-3/NOFORN) The objective of this effort is to investigate the possible effects of ambient geophysical/low-frequency electromagnetic (ELF) factors on RV performance.

## 1.2 (U) MAJOR GOALS

a. (S/CL-3/NOFORN) Phase I:: Search and summarize the literature on geophysical/ELF effects on biological organisms, especially as they relate to the degradation of human performance skills at a behavioral level.

b. (S/CL-3/NOFORN) Phase II: Examine the statistical correlation between RV performance in the historical SRI RV data base and ambient geophysical/ELF factors.

c. (S/CL-3/NOFORN) Phase III: Explore the statistical correlation between RV performance and ambient ELF fluctuations specifically, on the basis of real-time ELF monitoring.

d. (S/CL-3/NOFORN) Phase IV: Provide an evaluation report as to whether measurement of ambient geophysical/ELF factors can be used as an indicator of expected RV performance, and whether optimum performance windows can be identified.

## 2. (U) SPECIFIC TASKS

2.1 (S/CL-3/NOFORN) SRI International will conduct a literature search to collect and summarize up-to-date knowledge in the field of bio-electronics. The literature search will be carried out in the following categories:

- (1) Bioactive frequencies for ELF/VLF at the gross anatomic and behavioral levels.

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- (2) Effects of ELF/VLF frequencies at the biochemical (hormonal, ionic, molecular) level.
- (3) Effects of ELF/VLF at the neuronal membrane level.
- (4) Natural sources of ELF/VLF
- (5) Man-made sources of ELF/VLF.
- (6) Artificial generation of ELF/VLF.
- (7) Propagation characteristics of ELF/VLF.
- (8) Detection and measurement of ELF/VLF.

This will be accomplished by means of both references to literature on hand, and by computerized key-word searches.

2.2 (S/CL-3/NOFORN) SRI International will carry out an analysis to determine whether correlations between RV performance in historical data (data from previous experiments) and factors in the ambient geophysical environment exist. Data from previous studies conducted under controlled conditions will be analyzed by means of epoch, bivariate and multivariate analysis (when possible) against the following geophysical variables:

- (1) Weather (temperature, relative humidity, barometric pressure etc.).
- (2) Geomagnetic indices ( $A_p$ ,  $A_{fr}$ ,  $A_a$ )
- (3) Solar electromagnetic emissions
- (4) Sunspot number
- (5) Ionospheric conditions
- (6) Solar magnetic field
- (7) Lunar cycles

Further, since it is hypothesized that the mechanism by which geophysical factors could play a role in RV performance is by changing the ambient ELF environment, SRI International will examine this hypothesis as well. An ELF data base spanning a year and a half (from May 1982 to present) was monitored by a field station in Los Altos, California. Data was taken twice daily. The same analysis techniques used for the geophysical analysis will be applied to the ELF data. Positive results from these tasks could yield a rough index of expected RV performance given prevailing geophysical factors.

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*Does this mean that when our people are undergoing training, their sessions will be monitored?*

2.3 (S/CL-3/NOFORN) SRI International will implement a program of real-time ELF monitoring. Little information is available on the variation of the ELF environment from location to location, although it is known that ELF frequencies generated by geophysical means tend to vary simultaneously over the globe. Therefore, local variations may exist due to both man-made sources, and to the geologic structure of the area. For this reason, two ELF stations will be set up, one in SRI premises in the RV laboratory, the other at a field station 17 km distant. Data from the SRI station will be compared to the field station to determine the variability due to location and distance. This comparison may also help show whether RV performance is influenced by global, local, or both sources of ELF disturbances. Particular attention will be paid to bioactive frequencies found as a result of the literature search in Task I. Statistical correlations will be sought between RV performance (on an appropriate series of trials carried out in the RV chamber) and the ambient ELF fluctuations to determine whether measurement of ambient ELF can be used as an indicator of expected performance, and whether optimum performance windows can be identified.

3. (U) SECURITY

(U) Military security requirements in the performance of this contract will be maintained in accordance with the "CENTER LANE SECURITY PROCEDURES GUIDE," dated 1 March 1983 (S/CL-1/NOFORN/ORCON). The highest classification involved in the performance of this contract is SECRET/CL-4/NO FOREIGN DISSEMINATION/ORIGINATOR CONTROLLED.

4. (U) DELIVERABLES

(U) SRI International will provide the following:

4.1 (S/CL-3/NOFORN) A progress report (2 copies)--a written evaluation of findings (within 10 days of completion) of the Phase I literature survey.

4.2 (S/CL-3/NOFORN) A progress report (2 copies)--a written evaluation of findings (within 10 days of completion) of Phase II, investigation of the statistical correlation between geophysical/ELF factors and the historical RV data base.

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4.3 (S/CL-3/NOFORN) Following Phase III, an investigation of the statistical correlation between ambient ELF fluctuations and RV performance, a final report (3 copies) will be furnished within 30 days which include overall evaluation of the Geophysical Factors/ELF/RV Correlation Study Task.

5. (U) ACCESS TO MATERIAL

(U) Reasonable access to raw data material will be made to CENTER LANE personnel to ensure a full understanding of statistical methodology used during evaluations.

6. (U) SPECIAL REQUIREMENTS

(U) Requirements concerning the use of human subjects as outlined in the INSCOM Statement of Work on Identification of Selected Personnel, dated 2 August 1983, will be adhered to.

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ROBERT S. LEONARD

Director  
Radio Physics Laboratory  
Research & Analysis Division

**SPECIALIZED PROFESSIONAL COMPETENCE**

Radio-wave propagation: in normal environments; in naturally disturbed environments (aurora); in manmade disturbances (nuclear explosions)

**REPRESENTATIVE RESEARCH ASSIGNMENTS AT SRI (since 1961)**

Project director of a program to remotely sense nuclear detonations during the U.S. high altitude nuclear test program  
Led a research effort to improve the U.S. capability to detect foreign nuclear test by their effect on radio propagation  
Technical director of a large multicontractor research program to study the effects on radio propagation of an artificially produced ionospheric plasma  
Technical director on a program to develop special communications techniques

**OTHER PROFESSIONAL EXPERIENCE**

Instructor, researcher, and graduate student, Geophysical Institute, University of Alaska: HF and low VHF radio-wave propagation studies of auroral effects; designed, developed, and tested a prototype of the 41-MHz auroral radar used in the U.S. IGY program; installed and operated the six Alaskan IGY-auroral radars, and analyzed the data collected during the IGY  
Teaching assistant, Physics Department, University of Nevada

**ACADEMIC BACKGROUND**

B.S. (1952) and M.S. (1953) in physics, University of Nevada; Ph.D. in geophysics (1961), University of Alaska

**PUBLICATIONS**

"Observations of Ionospheric Disturbances Following the Alaska Earthquake," J. Geophys. Res. (March 1965); "Selection of a Model of the Earth's Magnetic Field," J. Geophys. Res. (December 1962); "Evidence of Low-Frequency Amplitude Fluctuations in Radar Auroral Echoes," J. Geophys. Res. (April 1962); "Distribution of Radar Auroras over Alaska," J. Geophys. Res. (March 1962); "A Low Power UHF Radar for Auroral Research," PIRE (February 1959); plus numerous scientific and technical reports

**PROFESSIONAL ASSOCIATIONS**

American Geophysical Union  
Union Radio Scientifique Internationale

HAROLD E. PUTHOFF

Senior Research Engineer  
Radio Physics Laboratory  
Research and Analysis Division

#### SPECIALIZED PROFESSIONAL COMPETENCE

Research in "remote viewing" and other psi phenomena (1972-present)  
Research in lasers, quantum electronics, nonlinear optics  
Research and development of tunable solid-state lasers, electron beam lasers, microwave tubes

#### OTHER PROFESSIONAL EXPERIENCE

Research associate, Hansen Laboratories of Physics, and lecturer, Department of Electrical Engineering, Stanford University; teaching, textbook author, research supervisor of Ph.D. candidates in the area of lasers and nonlinear optics  
Lieutenant, USNR: in-house research and contract monitoring on DoD (NSA) contracts concerned with the development of ultra high-speed (GHz) computers, assessment of potential of fiber optics and lasers for use in optical computers  
Research engineer, Sperry Electronic Tube Division, and Sperry fellow, University of Florida: design and testing of electron-beam focusing systems for use in microwave tubes

#### ACADEMIC BACKGROUND

B.E.E. (1958) and M.S.E. (1960), University of Florida; Ph.D. in electrical engineering, Stanford University (1967)

#### PUBLICATIONS AND PATENTS

Author or coauthor of more than twenty-five papers in professional journals on electron beam and laser research, and, more recently, first major publications of research on psi phenomena in Nature ("Information Transfer Under Conditions of Sensory Shielding," Oct. 1974), in the Proceedings of the IEEE ("A Perceptual Channel for Information Transfer over Kilometer Distances," March 1976) and in The Role of Consciousness in the Physical World: AAAS Selected Symposium 57, Ed. R. Jahn, ("Experimental Psi Research: Implications for Physics", Westview Press, 1981  
Coauthor of textbook, Fundamentals of Quantum Electronics (Wiley, New York, 1969) published in English, French, Russian;  
Coauthor of Mind Reach: Scientists Look at Psychic Ability (Delacorte, New York, 1977);  
Coeditor of Mind at Large: IEEE Symposia on the Nature of Extrasensory Perception (Praeger, New York, 1979);  
Patent on high-power tunable infrared laser source (50-250 microns)

#### PROFESSIONAL ASSOCIATIONS AND HONORS

American Association for the Advancement of Science, American Physical Society, Institute of Electrical and Electronics Engineers, Sigma Xi, Department of Defense Certificate of Commendation for Outstanding Performance, IEEE Franklyn V. Taylor Memorial Award for paper "A Scientific Look at ESP," listed in American Men and Women of Science and in Who's Who in the West



EDWIN C. MAY

Senior Research Physicist  
Radio Physics Laboratory  
Research and Analysis Division

**SPECIALIZED PROFESSIONAL COMPETENCE**

Charged particle and gamma-ray spectroscopy; analogue and high-speed digital electronics; numerical analysis; real-time computer applications for data acquisition and analysis; research in bio-feedback technology and applications, and cardiac blood flow problems; field research in India and laboratory research at Maimonides Medical Center on psycho-energetic phenomena, aerodynamic analysis from fixed wing, powerless soaring aircraft

**OTHER PROFESSIONAL EXPERIENCE**

Theoretical calculations in radiation transport;, atmospheric physics, and E & M wave scattering at the RAND Corporation  
Experiments in nuclear reaction mechanism and nuclear structure at the U. of California Crocker Nuclear Laboratory  
Undergraduate physics teaching at the City College of San Francisco  
Equipment engineer and clinical experience at the Bio-feedback Institute of San Francisco  
Research consultant on psychokinesis at the Maimonides Medical Center

**ACADEMIC BACKGROUND**

B.S. in physics, University of Rochester (1962); Ph.D. in physics, University of Pittsburgh (1968)

**PUBLICATIONS**

Author or coauthor of eleven scientific papers in experimental nuclear physics research;  
Author or coauthor of numerous scientific papers in psychoenergetic research;  
Author or coauthor of eleven research abstracts in nuclear physics for professional meetings  
Author or coauthor of ten abstracts in psychoenergetic research for professional and meetings

**PROFESSIONAL ASSOCIATIONS**

American Physical Society, American Association for the Advancement of Science, Institute of Electrical and Electronics Engineers, Parapsychology Association, The American Society for Psychical Research