Armed Forces Radiobiology Research Institute
Command Historical Report
1 January to 31 December 1963

The Command Historical Report for calendar year 1963 is submitted in accordance with the format described in OPNAVINST 5750.9.

1. Mission or Functions.

The AFRRI mission remains unchanged from that originally specified in DOD Directive 5154.16 of 12 May 1961 (commonly referred to as the AFRRI Charter). The mission of the Institute is to conduct scientific research in the field of radiobiology and related matters that are essential to the medical support of the United States military services, to national welfare, and to the well-being of mankind. To carry out this mission, in its two years of operational existence, AFRRI has developed and used three temporary internal organizational structures. Each of these was essentially an ad hoc type of structure improvised in order to pursue a few specific objectives (e.g., reactor training). During May 1963 the third temporary organization was effected, and during the period July to November 1963 the first organization of a permanent nature was developed. This latter organization was submitted to the Board of Governors for approval on 16 December 1963 and implemented on that date. Detailed charts of the proposed new organization and functional statements were included in Appendix A of the AFRRI document entitled "Activities and Status Report, 1 December 1963."

The first permanent organization was developed after a great deal of thought and discussion and with many objectives in mind. It was essential to find a structure in which civilian and officer scientists could work together efficiently with equitable career opportunities and adequate scientific freedom while, at the same time, pursuing the AFRRI mission in the best possible fashion. AFRRI now has four scientific departments (Analysis, Physical Sciences, Radiation Biology and Radiation Pathology) and four supporting departments (Administration, Program Coordination Office, Radiological Safety, and Information and Education). In addition, the new organization included the establishment of: a Theoretical Panel for the scientific review of the AFRRI research programs; an Educational Panel to advise the Directorate concerning the internal education and training program of the AFRRI; and a Council of Principal Investigators to provide a forum for discussion of subjects of common interest by professional personnel directly responsible for the pursuit of specific scientific projects.

2. Resume of Development.

Facilities:

Laboratories of the Biomedical Research Building (Phase I construction) became totally operational in September, 1963, upon completion of laboratory casework and storage facilities not included in the scope of the original phase I contract.

The Reactor Building (Phase I), besides housing the DASA-TRIGA Reactor, provided housing for a linear accelerator (LINAC). Final approval for additional funds required to effect the fabrication and installation of this additional source of radiation was received during November 1963.

Architectural and engineering design drawings for Phase II construction were submitted to the Area Public Works Office for final review on 30 April 1963, and a construction contract was let on 24 September 1963. Ground was broken on 8 October 1963 for construction of an annex (14,000 square feet) to the existing Biomedical Research Building and an addition (7,500 square feet) to the Animal Clinical Research Facility.

The Phase III construction program calls for an 18,000 square feet underground shielded facility to house a positive ion accelerator (PIA). The Committee on Armed Services, Eighty-eighth Congress, First Session, approved the construction of such a facility on 14 May 1963 and funds for same were included in the President's FY 1964 Budget, approved 7 November 1963.

Tentative plans for Phase IV construction call for three separate projects: a Fallout Simulator; an Armed Forces Training Center, and a Physics Wing. A contract (DA-49-146-XZ-261) for a fallout simulator feasibility study was awarded on 15 September 1963. A preliminary report including line drawings of piping, pumping, and control systems, and estimated costs of hardware and isotopes, was received 16 December 1963.

Related to the area of interest in fallout was a contract (DA-49-146-XZ-254) awarded 1 September 1963 for calculation of the angular and energy distribution of the gamma flux produced by a joint cobalt-60 source and by infinite plane monoenergetic sources. Results can be superimposed to simulate a mathematic model of a fallout field.

Staff:

The authorized military strength, officers and enlisted personnel, for AFRRI during 1963 was forty-five and that number was aboard as of 15 November 1963. In March 1963 AFRRI initiated an action intended to acquire twelve new officers, four from each service, to provide the manpower for the LINAC effort. As of 16 December 1963, the Army and Navy had approved their four billets each. Air Force had approved two billets and withheld action on the other two because of acute shortages in the specific skills required.

Attention was directed during 1963 on the recruitment of civilian personnel, as evidenced by the increase of civilian staff from 22 members as of 1 January 1963 to 60 as of 31 December 1963. The ceiling for AFRRI's civilian personnel complement was increased during October 1963 from 70 to 90.

3. Recognition of Accomplishment.

Captain Charles G. Bratenahl, MC, USN, formerly Head of the Radiation Pathology Department (AFRRI), was appointed Acting Deputy Director (Navy) on 1 July 1963 replacing Captain F. W. Chambers, Jr., MSC, USN, who retired. Captain Bratenahl was officially appointed Deputy Director (Navy) by the Secretary of the Navy on 29 November 1963.

Dr. Joseph A. Greenwood, Head of the Analysis Department, was elected a Fellow of the American Society for Quality Control, 5 April 1963.

Commendations and Awards:

Captain Francis W. Chambers, Jr., MSC, USN, upon his retirement 1 July 1963, was awarded the Navy Commendation Medal by the Secretary of the Navy for exceptionally meritorious conduct in the performance of outstanding service as Deputy Director of the Armed Forces Radiobiology Research Institute from 12 July 1961 to 1 July 1963, and as a consultant to the establishment project for the Institute from March 1958 until he assumed the Deputy Directorship.

Lectures:

Colonel Carl L. Hansen, Jr., MC, USAF, Deputy Director of the AFRRI, presented a lecture on "Accidental Exposure from Klystron Tubes" to Classes No. 13 and 14 of Medical Officers' Course in Radioisotope Techniques and Nuclear Medicine, Naval Medical School, Bethesda, Maryland.

Colonel Hansen lectured on the "Acute Radiation Syndrome" at the MEND (Med. Educ. for Nat'l. Defense) Symposium at the National Naval Medical Center.

Twice during 1963, May and November, Colonel Hansen was invited to present lectures to students enrolled in a course on the Medical Aspects of Advanced Warfare at Gunter Air Force Base, Alabama. Colonel Hansen is widely recognized as an authority on partial body radiation injury and long-term effects of radiation.

Captain Charles G. Bratenahl, MC, USN, Deputy Director of AFRRI, gave a lecture on "Pathology of Radiation Exposure" at the Allied Command, Atlantic Fleet, NATO Medical Officers Symposium at the Naval Medical Research Institute, Bethesda, Maryland.

LCDR Calman Levich was guest lecturer on physiology at the U. S. Naval Dental School course of Postgraduate Dentistry, Bethesda, Maryland.

Invitations:

Colonel James T. Brennan, MC, USA, Director of AFRRI, was invited to be chairman of the Sessions on Radiobiology at the annual meeting of the Radiological Society of North America, Chicago, Illinois.

Colonel Brennan, together with Captain Charles G. Bratenahl, MC, USN and Colonel Carl L. Hansen, Jr., MC, USAF, Deputy Directors of AFRRI, and Dr. S. J. Baum, Dr. T. A. Strike, Major L. J. Seigneur, Major W. F. Pfeiffer, and LCDR C. Levich, AFRRI staff members, attended the "International Atomic Energy Agency Symposium on Biological Effects of Neutron Irradiations" at Brookhaven National Laboratories, New York.

Colonel Hansen and Captain Morton D. Cohan, CMLC, USA, Head of the Radiochemistry Division of the Physical Sciences Department, attended the "III Colloque International de Biologie de Saclay - Activation Analysis and Its Application to Biological Sciences," Paris, France.

LtCol. Joseph J. Franaszek, TC, USA, attended the conference of the Biomedical Panel of the Tripartite (US-UK-Canadian) Technical Cooperation Program, London, England.

LCDR C. Levich, MSC, USN, attended the "International Symposium on the Response of the Nervous System to Ionizing Radiation," Berkley, California.

Mr. S. W. Porter, Jr., Head of the Radiation Safety Department, presented a paper at a Symposium of the Baltimore-Washington Chapter of the Health Physics Society entitled "Neutron Activation of Mice and Rats."

4. Participation in Special or Joint Exercises.

Completion of Phase I Operating Limits - AFRRI Report (File No. 3930/1) "Performance Characteristics of the DASA-TRIGA" was submitted 1 February 1963 to document the initial operating experience of the reactor staff. This report was approved by the Director on 27 March 1963.

The first biological experiment at AFRRI was initiated on 2 April 1963 when C57 black mice and Sprague Dawley rats were used in the first of a series of irradiation exposures of experimental animals to establish base line data of the effectiveness of ionizing radiations on several species of animals. Concurrently, Sprague Dawley rats were exposed to study the radiation effects on serum proteins. A study of the "Sequence of Pathological Changes in Tissue Morphology Following Ionizing Radiations" was initiated on the same rats. Also initiated was a project to investigate the recovery factors of the erythrocyte presursor cells in the bone marrow following radiation injury.

From 1 September to 6 December 1963 an AFRRI team participated in a joint project MRMU (Mobile Radiation Measuring Unit) with the Division of Biology and Medicine, Atomic Energy Commission, and the firm of Edgerton, Germeshausen and Grier at the AEC Nevada Test Site. The purpose of this project was to make free air measurements and depth dose determinations in human phantoms from a simulated fallout field.

AFRRI was engaged in a major joint effort from 20 October to 2 November 1963 with the Bionucleonics Department of the USAF School of Aerospace Medicine. Thirty-two rhesus monkeys were exposed in the Fast Neutron Exposure Room to pulse mode, fission spectrum radiation doses for an "Incapacitation" study. This was followed in the latter part of November and December by AFRRI's own similar studies to provide a clearer description of the course of clinical events likely to ensue in man as a consequence of exposure to nuclear detonation.

5. Training.

Considerable Temporary Additional Duty (TAD) was performed during 1963 by the AFRRI staff for purposes of orientation training, formal training, and to act as technical observers.

The Institute served as a training activity for a number of summer (Civil Service) employees.

6. Location of Flag Headquarters.

AFRRI is located at the National Naval Medical Center, Bethesda, Maryland. The Institute is governed in matters of policy and technical direction by a Board of Governors consisting of the Chief, Defense Atomic Support Agency (chairman), and the Surgeons General of the three military services. The research programs of the Institute are funded by the Defense Atomic Support Agency and administrative services are funded by the Navy Bureau of Medicine and Surgery.

7. Account of Unique or Unusual Events.

Two Board of Governors meetings were held at the Institute on 12 June and 16 December 1963. Two documents were prepared prior to these meetings to provide a review of the Institute's activities: "Organization and Activities, 1 June 1963" and "Activities and Status Report, 1 December 1963."

Three mathematical studies were published during 1963:
AFRRI Math Study No. 63-1, 15 April 1963, "Flexible Geometry Irradiator Estimate of Isotope Inventory."
AFRRI Math Study No. 63-2, 30 April 1963, "The Fuchs Model for the DASA-TRIGA Reactor."
AFRRI Math Study No. 63-3, "A Response Surface Method of Mapping Nuclear Radiation Exposure Rooms."

Extensive preliminary studies in connection with tentative plans for the building of a Fallout Simulator (Phase IV construction) culminated in the Physical Sciences Report 1-63, 19 July 1963, entitled "Development of a Fallout Simulator (Physical Aspects)."

AFRRI accomplished the basic designs and studies for a simple mechanical analog computer to be used for fallout computations under field conditions. This Fallout Computer Board is referred to as GRACMOP (Graphical Computer Manually Operated).

AFRRI was host to four scientific conferences during 1963:
March 14-15 - Working Panel N-1 of the Tripartite Technical Cooperation Panel Subgroup N (Biomedical Aspects of Nuclear Weapons Effects)
July 17-18 - The Twenty-Third Meeting of the DOD Panel on Radiological Instruments
October 18-19 - The Department of Defense Research and Engineering Advisory Panel
October 30 - The Allied Command, Atlantic Fleet, NATO Medical Officer's Symposium

Distinguished Visitors from Abroad Included:

Dr. Nils Starfelt, Research Institutes of Defense, Stockholm, Sweden
Col. E. H. Lauschner, AAFCE - West German Luftwaffe, Fontainebleau, France
Dr. A. Wensel, Institute fur Kernphysik, Der Universitat Frankfurt, West Germany
Dr. Brandon Lusch, Medical Research Council, London, England
Brig. Gen. (MC) M. Cazeilles, Medical R&D, Armed Forces of France
Col. (MC) R. LeMaine, Medical R&D, Armed Forces of France
LtCol. (MC) A. Aeberhardt, Medical R&D, Armed Forces of France
Dr. Peter Alexander, Chester Beatty Research Institute, London, England
Maj. Gen. Hidetoshi Nakaguro, Commandant, Ground Self Defense, Medical School, Tokyo, Japan
Dr. Klaus Beckev, RADIAC Consultant, West German Ministry of Defense, Bonn, West Germany
Dr. Suroto Ronoderadjo, Institute of Atomic Energy, Djakarta, Indonesia
Maj. Gerard Legeay, Army of France, Fontenay-Aux-Roses (Seine), France
Col. Harold Whitcher, RAMC, Royal Army Medical College, Millbank, England

Sixteen participants in the ACLANT Medical Officers Symposium including:
Surgeon Rear Adm. M. H. Adams, Royal British Navy
Surgeon Rear Adm. T. A. Dehaan, Royal Netherlands Navy
Surgeon Commodore W. J. Elliot, Royal Canadian Navy
Dr. J. Goffin, Belgium Medical Advesorto NATO Headquarters
Dr. A. C. Hasdman, Chief, Canadian Health Service, Ottawa, Canada
Dr. M. Waisfisz, Medical Advisor to the National Medical Defense Board, The Netherlands
Dr. Henri Birier, Medecim Nen Chef de Lere, French Navy
Surgeon Capt. R. W. Duncan, Royal British Navy
Col. G. R. Reid, British Army Staff, British Embassy, Washington, D. C.
Group Capt. J. M. Urquhart, Royal Air Force
Surgeon Capt. M. Winge, Royal Danish Navy
Wing Cdr. W. A. Crawford, Royal Air Force
Surgeon Cdr. J. Glass, Royal British Navy
Surgeon Cdr. E. Deddes, Royal Netherlands Navy
Surgeon Cdr. D. O. Kryvi, Royal Norwegian Navy
Surgeon LCDR E. Kierstead, Royal Canadian Navy

8. Chronological Record of Directors.

Director: Col. James T. Brennan, MC, USA, 12 July 1961-present

Deputy Directors: Capt. Francis W. Chambers, Jr., MSC, USN, 12 July-1 July 1963

Col. Carl L. Hansen, Jr., MC, USAF, 12 July 1961 - present

Capt. Charles G. Bratenahl, MC, USN, 1 July 1963 - present

9. Inventory of Historical Items.

Two Models:
A model of the Construction phases of AFRRI.
A dynamic model of the DASA-TRIGA Reactor.

Three documentary films:
"Rodent Irradiation for $LD_{50/30}$ Studies"
"A Review of the AFRRI-SAM Experimental Studies"
"AFRRI Instantaneous, Absolute Incapacitation Studies"

Two display exhibits:
The AFRRI-DASA Exhibit - for use at outside exhibits
The AFRRI Display Panel - for internal use for tours, etc.