

95  
 X2/2  
 X203



DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING  
 WASHINGTON, D. C. 20301

12 MAR 1970

MEMORANDUM FOR THE SECRETARIES OF THE MILITARY  
 DEPARTMENTS  
 CHAIRMAN, JOINT CHIEFS OF STAFF  
 ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)  
 ASSISTANT SECRETARY OF DEFENSE (MANPOWER  
 AND RESERVE AFFAIRS)  
 ASSISTANT SECRETARY OF DEFENSE (SYSTEMS  
 ANALYSIS)  
 ASSISTANT TO THE SECRETARY (ATOMIC ENERGY)  
 ASSISTANT DIRECTOR (NUCLEAR PROGRAMS)

SUBJECT: Radiobiology Research in the DoD

The radiobiology research programs of the DoD have recently been reviewed by an Ad Hoc Committee at my request. A copy of the report (less appendices) is attached. The Committee has concluded that radiobiology research in the DoD has reached a technical point where a change of direction, a consolidation of staff and program and a reduction of funding is in order.

The DoD radiobiology research program has been mainly devoted to nuclear weapons effects research (NWER) since its inception. The Committee has concluded that the biological data and predictive information required by weapons systems designers and potential weapons users is either in hand or will be in the next two to three years.

It now appears that the effort should focus upon the medical aspects of preventing and treating radiation illness. With this change in direction and with fewer resources available in people and money to support all DoD research, I believe that it is appropriate to consider consolidation and redirection of this program. The Navy has no effort in this area; the Army has cancelled its in-house program at Walter Reed Army Institute of Research; the Air Force has cut its budget in half since FY 69. The present DASA program will essentially reach a technical end by FY 72-73.

The major DoD resource in radiobiology research is the Armed Forces Radiobiology Research Institute (AFRRI) at the National Naval Medical Center in Bethesda. We have a \$14.0M investment in one of the best facilities in the country. This laboratory is capable of supporting the entire DoD effort. The Committee has recommended that the AFRRI be removed from the command of the Director, DASA, and placed under the management control of the Secretary of the Navy for further management by the Surgeon General of the Navy as a tri-Service medical research laboratory. The model proposed is that of the Armed Forces Institute of Pathology.

Beginning in FY 72, significant savings could be achieved, so that by FY 76 the program should cost \$3.2M a year rather than the present \$5.3M. In addition, by increasing military medical department officer spaces at the AFRRI we would retain a cadre of uniformed staff who will otherwise be lost as the Military Departments reduce or eliminate their in-house programs.

I would like your comments on the recommendations of the report that separate efforts in each department be phased out and that funds and personnel spaces be consolidated at the Armed Forces Radiobiology Research Institute; that the Institute be placed under the Secretary of the Navy as executive agent and under medical control and direction, and that the research effort be primarily focused upon the medical aspects of preventing, diagnosing and treating illness due to ionizing radiation. A capability to perform radiobiological NWER will be retained.

Dr. Donald MacArthur, Deputy Director (Research & Technology), is the ODDR&E point of contact. I would like to have the benefit of your comments by 1 April 1970.

*prep - CT*

Attachment

*for*   
John S. Foster, Jr.

10 MAR 1970

95  
X 2/12  
X 202

**MEMORANDUM FOR: DIRECTOR, DEFENSE RESEARCH AND ENGINEERING**

**SUBJECT: Report of Ad Hoc Radiobiology Research Review Committee**

This memorandum forwards the report of an ad hoc committee formed to review DoD research in radiobiology. The committee was directed to define the problems, outline the present programs, describe the efforts of other Federal agencies, and make recommendations for the organization and support of the DoD program. The conclusions and recommendations of a long report with several appendices are briefly summarized here:

Conclusions.

The major conclusions are:

1. The present programs in biological nuclear weapons' effects research (BNWER) on flash-blindness, protective materials, blast effects, and skin and eye thermal effects, will have reached their present goals by FY-72. The requirements of weapon systems users for predictive data will be complete for all practical purposes.
2. The present programs in human survivability/vulnerability, in prediction of incapacitation, and of performance degradation, will satisfy operational requirements by FY-74/75.
3. The present program in anti-radiation prophylactic drugs has produced three drugs which provide a dose reduction factor of two; one drug has passed a preliminary test in man for tolerance of the drug. No such drug can be definitively tested in man for efficacy. The original goals of the program have been met; all that is now required is to complete human tolerance tests, which will be done by FY-75.
4. The DoD has a unique laboratory for radiobiological research in the Armed Forces Radiobiology Research Institute (AFRRI), now controlled by DASA. DoD has an investment of \$13.8M in this facility, which has resources to support the long-term research goals in DoD radiobiology research.

5. The Army and Navy no longer have in-house radiobiology programs; the Air Force has gradually reduced its effort over the years. The committee believes that the past requirements for separate service radiobiological NRES have been met, and that a consolidated effort is now required to conserve money and manpower.

6. The future problems for DoD radiobiology research are in the areas of diagnosis and therapy of illness due to ionizing radiation. Related aspects of preventive medicine, where state-of-the-art permits, should also be investigated. An occasional acute problem in NRES may arise in the future, but DoD now needs medically-oriented programs as its new major goals.

### Recommendations.

The major recommendations are:

1. The AFPHI should be designated as a common medical research facility under the management control of the Secretary of the Navy and the Navy Surgeon General. The recommended model is the Armed Forces Institute of Pathology. The reflection of the AFPHI program above Department of Navy level should be to the Director, Defense Research and Engineering.

2. The research program of such a tri-service laboratory should be focused on preventive, diagnostic, and therapeutic aspects of ionizing radiation illness. Fundamental research should be relevant to these applied programs. The research program should retain the capability to perform such radiobiological NRES as is required in the future by DASA and the military departments.

3. If such a reorganization of the AFPHI is done, provision should be made to increase the number of manpower spaces for career military health profession officers, in order to retain at least a cadre of such skills for operational, staff and command assignments.

4. The remaining radiobiology programs in the Army and Air Force should be phased out or transferred to the AFPHI, beginning in FY-71 and completing the transfer by FY-75.

5. The AEC (\$89.5M effort) should remain the research leader in radiobiology, especially for basic research, genetics, ecology, and clinical use of isotopes. The NASA (\$605K effort) should provide the lead on acute and chronic effects of particulate radiation. The Department of ESW (\$2.7M effort) should lead in long-term epidemiological research and in health physics. The OGD (\$800K effort) should lead in fallout studies.

6. The programs now funded in radiobiological HWER on retinal burn should be adequately covered in the medical R&D efforts (\$1.50) in laser effects research.

7. As a result of change of research goals and of consolidation of facilities the cost of the DoD radiobiology research program should be reduced from the FY-71 cost of \$5.34 to \$3.25 by FY-76.

I have reviewed the committee's report and concur in its findings. The next step is to secure comment from the military departments and other interested organizations. If general approval is received, then the Secretary of Defense can request the interested organizations to establish a planning group to write the appropriate organizational directives under the lead of the Secretary of the Navy.

~~XXXXXXXXXX~~

Will you sign the attached memorandum distributing the committee's report for review and comment.

(Signed) Donald M. MacArthur

D. M. MacArthur

LTC JOY/Mc 3/10/70  
OAD/ST/BlMed  
3D-129 79215



OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING  
WASHINGTON, D. C. 20301

MEMORANDUM FOR: DEPUTY DIRECTOR (RESEARCH AND TECHNOLOGY)

SUBJECT: Transmittal of Report of DDR&E Ad Hoc Radiobiology Research  
Review Committee

In response to your request, a committee was formed with representatives from the Army, Navy, Air Force, Defense Atomic Support Agency, and the Office of the Assistant Director (Chemical Technology). The committee heard presentations from each military department and DASA, made an on-site visit to the Armed Forces Radiobiology Research Institute, and secured information about the radiobiology research programs of the Atomic Energy Commission, the Department of Health Education and Welfare, the National Aeronautics and Space Administration, and the Office of Civil Defense.

The major conclusions of the committee, as presented in the report, are that nuclear weapons' effects research is essentially complete for the present time; that separate radiobiology research programs in each military department are no longer required; that the DoD radiobiology research effort should be centralized, and that the radiobiology research problems of the future are the medical problems of diagnosis, prevention and treatment of illness due to ionizing radiation.

The major recommendations are that DoD radiobiology research should be centralized at the AFRRI; that the AFRRI should be made a tri-service laboratory under the executive management of the Secretary of the Navy and the Navy Surgeon General; that the research program at the AFRRI should be directed at the solution of medical problems, and that the military departments should phase out their separate efforts or transfer the work to the AFRRI. If these recommendations are adopted, we believe that the present cost of the program of \$5.3M for FY-71 could be reduced to \$3.2M by FY-76.

I will be pleased to discuss the findings of the committee with you at any time.

*Chris J. D. Zarafonitis*

Chris J. D. Zarafonitis, M.D.  
Chairman, Ad Hoc Radiobiology  
Research Review Committee  
Professor of Medicine  
University of Michigan

TABLE OF CONTENTS

<u>Item</u>	<u>Tab</u>
Committee Reports	A
Establishing Memorandum for the Ad Hoc Committee, 29 July 1969	B
Outline of Committee Policy, Working Memorandum No. 1	C
Defense Atomic Support Agency and Armed Forces Radiobiology Research Institute Programs	D
Department of the Navy Program	E
Department of the Army Program	F
Department of the Air Force Program	G
Atomic Energy Commission Program	H
National Institute of Health Program	I
Office of Civil Defense Program	J
National Aeronautics and Space Administration Program	K
Command Relationships, AFRI, 23 Sept. 1963	L
DoD Directive 5120.30, Armed Forces Institute of Pathology, 6 August 1963	M

TAB A  
COMMITTEE REPORT

## SUMMARY

The radiobiology research programs in DoD, AEC, NASA, and HEW were surveyed to determine if the DoD program was appropriate to the needs of today's problems.

After 25 years of nuclear weapons effects research, the Committee concluded that the program emphasis should change from effects research for predictive purposes to medically oriented and directed programs aimed at providing information about diagnosis, prevention and treatment of ionizing radiation illness.

In order to conserve staff and funds and most fully utilize facilities, the Committee recommends that the separate radiobiology research programs of the military departments be combined at the Armed Forces Radiobiology Research Institute (AFRRI), Bethesda, Maryland. The Committee further recommends that the command of AFRRI be transferred from the Defense Atomic Support Agency to the Secretary of the Navy as Executive Manager. It is believed that funding can thus be reduced from the present \$5.1M to \$3.2M by FY 1976.

## REPORT OF AD HOC DDR&E RADIOBIOLOGY RESEARCH REVIEW COMMITTEE

### INTRODUCTION

This committee was formed to evaluate DoD RDT&E in radiobiology and to determine:

1. What is the medical problem as related to the military mission?
2. What is the present DoD program and can it solve the problem?
3. What are the AEC, HEW and NASA programs and what aspects are applicable to the DoD problem?
4. How should DoD organize, fund and staff its radiobiology research program?

These questions, the Committee findings, and a recommended program are addressed below.

### GENERAL COMMENTS

Radiobiology research is divided into two general areas: (1) nuclear weapons effects research (NWER) and (2) medical aspects of the prevention, diagnosis and therapy of illness due to ionizing radiation. In NWER, investigations are separated into studies of ionizing radiation effects, blast effects, and thermal effects. In each of these areas, the problems studied have related to casualty prediction, dosimetry, incapacitation, vulnerability and physical protection. In medical aspects, the same three kinds of effects have been studied, the problem areas have been separated into prevention, general and specific treatment, and basic research in radiobiology.

### THE PROBLEMS

In general, the Committee found that DoD radiobiology research has been mostly directed at answering the questions of weapons systems designers and potential users. The primary, long-term goal for future DoD radiobiology research is to reduce the effects of ionizing radiation on Service personnel. The secondary goals, in order of priority, are:

1. NWER on various gamma/neutron ratios. The presently planned programs are structured to be essentially complete in FY 1973.
2. Finish NWER on flashblindness protective materials. The radiobiology research aspects of this work will be finished in FY 1972.

### THE PRESENT PROGRAMS

#### I. Defense Atomic Support Agency Program

A. The DASA program is a NWER program. Forty percent is done on contract and sixty percent at the Armed Forces Radiobiology Research Institute (AFRRI). The FY 70 funding is \$4.119M; the program is

controlled by the Director, DASA, and managed by medical staff assigned to the DASA Medical Directorate. AFFRI is a DASA laboratory.

B. The Armed Forces Radiobiology Research Institute Program

1. The total staff is 145 civilians, 30 officers and 26 enlisted men. Two-thirds of the staff are in R&D, one-third is in support and administration. 33 members of the staff have doctoral degrees, 24 have masters degree.
2. Total funding for FY 70 is \$2.6M; of which basic overhead and salaries cost \$1.7M.
3. The building program begun in 1960 is now complete. The investment in building is \$7.8M; in radiation sources it is \$6.0M; thus for total facilities there is an investment of \$13.8M.
4. The program is directed toward four overall areas:

<u>Area</u>	<u>Percent of Funds</u>	<u>Percent of Staff</u>
a) Incapacitation/performance decrement	41	45
b) Acute lethal effects	31	36
c) Biochemistry/Physiology	18	14
d) Biophysics/Physics Support	10	6

5. Except for a shortage of animal quarentine facilities, the AFFRI has the physical plant and radiation sources to support the long-term DoD goals in radiobiology research. Present staff and money shortages prohibit using the radiation sources much beyond a 40-hour work week. Radiation source use could be extended by double shifting if more staff were available.

C. Incapacitation and Performance Degradation; NWER(overall DASA efforts)

1. Funding is \$1.0M a year, with 60% of the work done at AFFRI and the remainder at the USAF School of Aerospace Medicine. This present program is planned for completion in FY 1973, with the exception of a small continuing effort in mixed gamma/neutron ratio studies.
2. The goal is to define the acute effects of lethal and supra-lethal doses of ionizing radiation and to predict the ability of a man to complete a mission, even though he is expected to die from radiation injury. These data are needed by military planners and potential weapon users to define the levels of "hardening" of systems and to predict the effects of our weapons on personnel.

D. Blast Effects; NWER

1. Funding is \$150K, on contract. This program will be ended in FY 1972.

E. Thermal Effects; NWER

1. Funding is \$770K, on contract; the research is on skin burn and flashblindness. This program will be ended in FY 1972.

F. Radiation Injury - Fundamental Research

1. This is basic work on NWER. Funding is \$1.75M, with 80% of the work carried out at AFRRI.
2. The goal is to provide basic information about the responses of cells, organs and animals to ionizing radiation, using the tools of specific disciplines such as biochemistry, physiology, etc.

G. Treatment of Radiation Injury

1. This is a medically oriented program. Funding is \$200K, all at AFRRI. The effort is on physiological support for the irradiated individual.

II. The Department of the Navy Program

A. There is no USN program in radiobiology research since the Naval Radiological Defense Laboratory closed.

B. There are now 40 military officer personnel spaces in nuclear medicine, all assigned to operational, clinical and staff positions.

III. The Department of the Air Force Program

A. This is primarily a NWER program, with some studies on mechanisms of action of ionizing radiation. FY 70 USAF funding is \$195K; DASA and NASA provide another \$300K of support.

B. Research Studies

1. Survivability/vulnerability data on man as a system component in the programming of present and the designing of future Air Force weapons systems.
2. Effects of low level (fallout) dosage on primate performance.
3. Combined effects of radiation and the operational flight environments, such as acceleration, vibration, hypoxia, etc.
4. Use of a whole body counter in the clinical evaluation

program of the School of Aerospace Medicine.

5. Completion of research work on flashblindness parameters.
6. Program of Biophysics Division, AF Weapons Laboratory, Kirtland AFB
  - a) Using GODIVA reactor; radiating sheep with various neutron/gamma mixtures (DASA supported).
  - b) Computer modeling studies to predict crew exposures in different aircraft configurations.
  - c) OV-1 satellite dosimetry (NASA support).
  - d) Scientific staff: 21 military; 6 civilians
  - e) Technical staff: 9 military; 7 civilian
  - f) USAF funds at \$50K/year.  
DASA funds at \$90K/year.  
NASA funds at \$60K/year.

C. The critical and unique USAF problem is the survivability/vulnerability analysis of man as a system component in present and future USAF weapon systems--to include: (1) The external radiation-blast-thermal environment up to 100,000 feet. (2) The evaluation of performance degradation under the multiple stresses of the operational flight environment.

D. There are 81 professional and 16 technical people assigned to the program.

E. There was a request (deferred) in the FY 71 MCA for \$1.1M for a Bionuclear Effects Laboratory at Kirtland AFB.

#### IV. The Department of the Army

A. This is primarily an anti-radiation prophylactic drug development program. It has cost approximately \$15.0M in the past 10 years and has produced 3 drugs which are now ready for tolerance testing in man. These may double the radiation dose required to produce symptoms or illness, i.e., a dose reduction factor of two. It has also serendipitously produced a drug which may be useful in treating shock. The tactical need for such a drug remains as high as it was 10 years ago, since tactical operation in a fallout field or an area contaminated with radioactivity may be possible only to forces which possess such a drug. The yield of the program has been commensurate with its expense. A recommendation was made for an 8-year effort in drug development, total cost \$160M, if tactical requirements support the expenditure. It was also suggested that a major use of such drugs would be for Civil Defense stockpiles.

B. The present Army requirements for radiobiology research were given as the development of methods of diagnosis and therapy of radiation injury, usable in the field, i.e., simple and relatively unsophisticated, such as use of specialized antibiotics, provision of sterile capsule environments for patients, field usable methods for platelet transfusion, bone marrow transplantation, etc.

C. The Army recently closed its Division of Nuclear Medicine at Walter Reed Army Institute of Research (cost \$200K a year) and is closing down the WRAIR reactor. A TRIGA reactor at Forest Glen Section of WRAIR, owned by Harry Diamond Laboratory, is available for part-time medical use.

D. There are 65 professional officer personnel spaces in the Army nuclear medicine program, now primarily for staff, command, and clinical assignments.

V. Summary of DoD Programs

	<u>USAF</u>	<u>USA</u>	<u>USN</u>	<u>DASA</u>	<u>TOTALS</u>
Cost - \$ in M	0.2	1.4	0	4.12	5.72
People*	93(12)	65(11)	40(12)	202(35)	326
Major effort	Performance degradation NWER	Prophy- lactic Drug Develop.	0	Incapacita- tion NWER	

\* ( ) are military officer spaces assigned to DASA at AFRRI.

OTHER FEDERAL AGENCY PROGRAMS

I. Atomic Energy Commission Program

A. Total cost, Radiobiology, and Nuclear Medicine - \$89.5M in FY 70

B. The major AEC laboratories used are: Argonne, Brookhaven, and Oak Ridge with some radiobiology programs at Los Alamos and Livermore.

C. Program Areas and Funding - FY 1970 figures.

1. Effects of radiation on living organisms: Low sub-lethal doses delivered to large populations of animals and men (patients). Responses of organ systems and tissues. \$12.4M.
2. Molecular and cellular radiobiology. Biophysics and photo-biology: studies of how radiation is absorbed by living systems. \$16.3M.
3. Radiation genetics: study of damage at the chromosome level; later effects on population. \$7.5M.

4. Exposure to external and internal radiation (man and his environment); ABCC in Japan; radioisotope inhalation studies; ingested isotopes, radiopharmaceuticals. \$13.2M.
5. Combating detrimental effects of radiation: treatment studies; bone marrow transplants; pulmonary lavage. \$1.8M.
6. Marine sciences; nuclear and thermal effects; waste disposal effects on ecology. \$4.0M.
7. Land and Fresh Water Environmental Sciences: ecology studies; soil and water radioactivity; fallout studies. \$9.7M.
8. Atmospheric sciences: aerosol, dust, fallout transport; atmospheric pollution; upper air sampling. \$5.0M
9. Nuclear Energy Civil Effects: weapons effects on civilians; countermeasures. \$1.2M.
10. Radiological and Health Physics and Instrumentation: \$7.3M.
11. Cancer and Clinical Research: tracer isotopes for diagnosis and treatment; organ transplantation usage; \$7.5M.
12. Biological and Agricultural Research: Use of radioisotopes to benefit crops and animal husbandry. \$2.8M.
13. Radiation Preservation of Foods: Food chemistry; microbiology; wholesomeness. \$0.3M in FY 71, (no support in FY 70).
14. Chemical Toxicity: of radionuclides and non-radioactive compounds. \$0.6M.

D. Construction and Capital Equipment: \$6.1M.

## II. National Aeronautics and Space Administration Program.

A. Total cost for Radiobiology Research: \$605K in FY 1970.

B. The thrust of the program is the study of the effects of particulate ionizing radiation, with primary attention paid to protons, electrons, and solar flares.

C. Except for one project (\$65K) at Ames Research Lab., this is a contract program. The USAF School of Aerospace Medicine receives \$70K under this program.

### III. National Institute of Health Program

A. There is a radiological health research program in the Environmental Control Administration. The research effort is in the Division of Biological Effects. The work covers all radiation -- ionizing and non-ionizing. Total RDT&E funding for FY 1970 is \$2.7M.

B. An Experimental Studies Branch investigates basic and applied work with special reference to young developing tissue (fetal, in-utero), being especially concerned with low dose and low energy radiation. A new effort is being directed at radiation from television sets, microwave ovens, etc., as an in-house effort; the FY 70 support is \$1.2M.

C. Colorado State University Study of beagles given one 20 rad dose and followed for life span--\$0.7M in FY 70.

D. An epidemiology Studies Branch investigates radiation exposure levels from all sources, especially those used in medicine; the neuro-physiological and behavioral responses to radiation; genetic studies; dose-effect and threshold work; morbidity and mortality from radiation in specially selected populations. \$0.8M in FY 70, mostly on contact.

### IV. Office of Civil Defense

A. The program is mainly directed at fallout research studies; the FY 1970 budget is \$800K. There is a program in civilian casualty prediction, shelter selection, etc. which is not covered below because it is not directly germane to DoD programs or the instructions of the 29 July memorandum.

#### B. Program Areas:

1. Radiobiology: low, chronic dose delivery to large animals; fallout simulation; food and crop contamination; ecology; radiation in food chain. \$610K in FY 70.
2. Medical Research: clinical studies on burns; selection of drugs for shelter stockpiles. \$70K in FY 70.
3. Medical Planning: computer programs for medical deployment, review of AABC data. \$120K in FY 70.

C. The OCD stated that the Army anti-radiation protective drug program was of only modest interest to them. A dose reduction factor of 2 was not considered to be useful to the civilian population because nearly all shelters give at least 10 times that factor. OCD suggested that prophylactic drugs might be useful to those entering a contaminated area soon after an attack (fireman, public health people, etc.)

VI. Summary of other Federal Agency programs

- A. AEC: \$89.5M effort; all aspects of radiobiology except NWER and acute and high dose studies.
- B. NASA: \$605K effort; particulate radiation, chronic exposures.
- C. NIH: \$2.7M effort; primarily radiological health for civilian population.
- D. OCD: \$800K effort, fallout and civilian shelter work.

CONCLUSIONS AND RECOMMENDATIONS

I. What is the medical problem as related to the military mission?

- A. To provide for a medically oriented and directed diagnostic, therapeutic and preventive medicine program for radiation illness as the first requirement for DoD radiobiology research.
- B. Nuclear weapons effects research, after a 25-year effort, is now approaching completion. Eighty percent of the present effort in NWER should end in FY 1973.
- C. Research on blast effects is no longer needed.
- D. The thermal effects on skin and eye are covered in existing programs in burn and laser research.

II. What happens to on-going programs?

- A. The DASA program in NWER will decline to a modest effort by FY 1973. Minimum funding (approximately \$200-300K annually) should be provided for new NWER requirements.
- B. The DASA and USAF research programs in flashblindness protective materials will end in FY 72.
- C. The DASA effort on blast effects will end in FY 1972.
- D. The DASA program in thermal effects will end in FY 1971.
- E. The Dept. of the Navy should not reinitiate a radiobiology program.
- F. The Dept. of the Air Force
  - 1. Should continue research, at USAF facilities, on NWER on combined effects of radiation and the operational flight environment. This program should end in FY 75 as a radiobiology research effort.

2. Should transfer the whole body counter-research effort to its clinical evaluation of aircrew program.
  3. Should phase out and eliminate in USAF facilities and programs:
    - a. Survivability/vulnerability radiobiology research work by FY 75.
    - b. Flashblindness parameter research in FY 72.
    - c. Low level (fallout) dose level work in primates in FY 71.
  4. All biological experimentation should be phased out at the Biophysics Division, USAF Weapons Laboratory, Kirtland AFB, New Mexico, by FY 73-74. The DASA and NASA funded programs are terminating. It does not appear that with DASA/NASA support withdrawn that the USAF could separately fund the laboratory. Computer modeling and physical dosimetry programs as part of radiobiological NWER are dwindling in importance.
  5. By FY 1975, the Air Force should have terminated all in-house ionizing radiobiology research at Aerospace Medical Division Laboratories.
- G. The Dept. of Army should:
1. Phase out the anti-radiation prophylactic drug program as follows:
    - a. In FY 71 stop all funds for compound synthesis and screening.
    - b. By FY 72 stop all funds for animal toxicity and drug effectiveness research.
    - c. By FY 74 complete final human tolerance trials, complete Phase I FDA tests, to included tests for use of the drug by flight crew personnel.
    - d. The program should be terminated as an Army effort by FY 75, having provided one or two drugs with proven utility in animals and demonstrated human tolerance. These drugs can be stockpiled if DoD desires.

III. What can AEC, NASA and HEW contribute to the DoD mission?

A. AEC

1. Will remain the leader in the field, especially for the basic research d...

2. Can provide the low dose in man (patients) effects data.
3. Can provide the required information in genetics, ecology, health physics, fallout, new clinical applications, and much of the data on therapy of sub-lethal doses (fallout doses, especially gamma radiation).

B. NASA

1. Can provide the data on particulate radiation and its acute and chronic effects.

C. HEW

1. Can provide long-term epidemiological data.
2. Can do work of DoD interest in health physics with special reference to clinical application and use of ionizing radiation.

IV. What should the DoD Radiobiology Research program be?

A. Medically oriented and medically directed toward the problems of diagnosis, therapy, and prevention that are unique to the military forces and their operating environment, with especial attention paid to acute radiation effects.

B. Military Medicine

1. Develop simple methods for field usable diagnosis and therapy of radiation illness.
2. Develop regional shielding data and methodology for unique military medical preventive medicine problems in radiobiology.
3. Develop biochemical and physiological supportive or therapeutic methods for mission completion after receiving lethal doses.
4. Complete NWER studies of current interest to the military.
5. Perform NWER studies of future interest to the military.

V. How should the DoD Radiobiology research program be organized, staffed, and funded?

A. Requirements

1. To maintain a DoD in-house capability to perform medical and radiobiological NWER work for unique or high priority DoD needs.
2. To maintain a program for the development of professional

military personnel knowledgeable in military nuclear medicine for operational, staff and command assignments.

3. To conserve people and money in an era when DoD will be limited in both, by maximum use of existing people, facilities and funds by consolidation and centralization where operationally and technically feasible.

B. Programs in the Military Departments and DASA

1. The end of nearly all radiobiological NWER by FY 74-75 indicates that weapons oriented separate radiobiology research efforts in each military department should end. The Navy has done this. The Army has eliminated its in-house capability and should phase out its extra-mural programs. The Air Force should follow suit in ionizing radiation radiobiology research.
2. Since the effort should be focused on the medical problems of radiation illness, the common factor of man as patient provides the rationale for a central facility.

C. Organization

1. The AFRRI should be designated as a common medical research facility, similar to the Armed Forces Institute of Pathology (AFIP).
2. The Secretary of the Navy should be designated as the Executive Manager of the AFRRI, in the same manner that the Secretary of the Army manages the AFIP. It is recognized that this is a reversion to the original management of the AFRRI, which didn't work, and which had to be changed to the present DASA management. It is believed that changes in the people, plans and missions involved, as well as the greater experience in DoD with single manager tri-service functions, will permit such a reorganization to function as well as has the AFIP.
3. The planning for such a reorganization should indicate that the research direction and authority will be under the control of medical staff; that the AFIP model will be followed; and that the reflection of the AFRRI program above Department of the Navy level will be to the Director, Defense Research and Engineering. DASA should retain a voice in the AFRRI program by appropriate representation in the direction of the AFRRI effort. (Details of reorganization to be determined by planning group appointed by Sec Def.)

D. The Research Program of the AFRRI should:

1. Be oriented toward preventive, diagnostic and therapeutic aspects of nuclear medicine. Fundamental research should be relevant to these applied programs.

2. Accept the remaining programs of DASA and the Air Force.
3. Respond to unique military departmental problems in radiobiology and nuclear medicine - i.e., aircraft, armored vehicles, ship and submarine problems.
4. Respond to DASA needs for NWER research on either a continuing or an episodic basis.
5. Be established, organized, directed and performed so that the AFRRI will be the radiobiology and nuclear weapons effects reference laboratory for DoD, just as the AFIP is the pathology reference laboratory.

E. Staffing of the AFRRI

1. The DoD has a continuing need for officers, physicians, veterinarians, and allied scientists who are trained in nuclear medicine and radiobiology. The elimination of military department programs is eliminating this area of biomedical research, training and practice in the military medical departments. The Committee assumed a continuing DoD need for such officers in operational, staff, and command assignments.
2. In the planning process for reorganizing the AFRRI, the Committee recommends an increase in the number of military officer health professions personnel spaces from the present 17 to at least 40. This appears to be a logical way to maintain a career cadre of such people.

F. Funding

1. Past and present military department and DASA radiobiology programs and their out-year projections:

	<u>\$ in millions</u>						
	<u>FY 68</u>	<u>FY 69</u>	<u>FY 70</u>	<u>FY 71</u>	<u>FY 72</u>	<u>FY 73</u>	<u>FY 74</u>
Army	1.2	1.2	1.4	1.0	1.0	1.0	1.0
Navy	0.1	0.1	0	0	0	0	0
AF	0.4	0.4	0.2	0.2	0.2	0.2	0.2
DASA	<u>4.7</u>	<u>4.2</u>	<u>4.1</u>	<u>4.1</u>	<u>4.1</u>	<u>4.1</u>	<u>4.1</u>
Total	6.4	5.9	5.7	5.3	5.3	5.3	5.3

2. Recommended programs, assuming AFRRI reorganized in FY 71

\$ in millions

	<u>FY 71</u>	<u>FY 72</u>	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>	<u>FY 76</u>
Army	0.8	0.4	0.2	0.2	0.0	0.0
Navy (AFRRI Manager)	--	2.9	3.0	3.0	3.0	3.0
Air Force	0.2	0.2	0.2	0.2	0.1	0.0
DASA	<u>4.1</u>	<u>1.4</u>	<u>1.0</u>	<u>0.5</u>	<u>0.2</u>	<u>0.2</u>
TOTAL	5.1	4.9	4.4	3.9	3.3	3.2

3. Recommend program for the AFRRI (FY 71 funds from DASA)

<u>FY 71</u>	<u>FY 72</u>	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>	<u>FY 76</u>
2.6	2.9	3.0	3.0	3.0	3.0

4. Final recommended total program for DoD for level effort of future funding.

<u>FY 72</u>	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>	<u>FY 76</u>
4.9	4.3	3.9	3.3	3.2

Chris J. D. Zarafonetis, M.D.  
 Chairman  
 Ad Hoc Radiobiology Research  
 Review Committee  
 Professor of Medicine  
 University of Michigan

Committee Members

Captain Ben K. Hastings, MC, USN - Bureau of Medicine & Surgery, USN  
 Colonel Edward J. Huycke, MC, USA - DASA (Surgeon)  
 Colonel Robert W. Neidlinger, MC, USA - USA Medical Rsch & Dev. Command  
 LTC William Howell, MC, USAF - Ofc of the Surgeon General, USAF  
 LTC Robert J. T. Joy, MC, USA - OAF(CT), ODDR&E

TAB B

Memorandum, 29 July 1969

D.M. MacArthur to G. Tucker

Subject: DoD Research in Radiobiology

TAB C

Working Memorandum #1

Ad Hoc DDR&E Radiobiology Research

Review Committee

22 September 1969

TAB D

1. Working Memorandum #2  
Ad Hoc DDR&E Radiobiology Research  
Review Committee, 6 October 1969
2. DASA Medical NWER Program,  
Review of effort, 3 October 1969
3. Armed Forces Radiobiology Research  
Program, 3 October 1969
4. DASA Medical NWER Program,  
FY 70 Funding, 8 October 1969

TAB E

1. Working Memorandum #3,  
Ad Hoc DDR&E Radiobiology  
Research Review Committee,  
18 November 1969. Section  
on Department of Navy Program.
2. Professional Manpower Requirements,  
Radiation Health Care, Bu Med,  
16 May 1969
3. Radiation Safety Branch,  
Code 742 Billets, BuMed,  
4 August 1969

TAB F

1. Working Memorandum #3,  
Ad Hoc DDR&E Radiobiology  
Research Review Committee,  
18 November 1969. Section on  
Department of the Army program.
2. Proposed Acceleration of USA  
Program on Sulfhydryl Drugs  
15 March 1969
3. U.S. Army Medical Dept. Personnel  
Trained in Radiation Biology,  
24 October 1969

TAB G

1. Working Memorandum #3,  
Ad Hoc DDR&E Radiobiology  
Research Review Committee,  
18 November 1969. Section on  
Department of the Air Force Program
  
2. USAF Briefing for DDR&E  
Radiation Biology Review  
Committee, 23 October 1969

TAB H

Atomic Energy Commission  
Biology and Medicine Program  
Fiscal Years 1970 and 1971

TAB I

Department of Health, Education  
and Welfare; Division of Biological  
Effects Program, 30 October 1969

TAB J

Office of Civil Defense

Radiobiology Program

3 November 1969

TAB K

National Aeronautics and  
Space Administration  
Radiobiology Program  
14 October 1969

TAB L

Memorandum, 23 September 1963,  
Director, DASA to Surgeon General  
Department of Navy

Subject: Command Relationships  
Armed Forces Radiobiology  
Research Institute

TAB M

Department of Defense Directive  
5120.30, 6 August 1953,  
"Armed Forces Institute of Pathology"