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COMMITTEE ON MEDICAL SCIENCES  
and  
COMMITTEE ON ATOMIC ENERGY  
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JOINT PANEL ON MEDICAL ASPECTS OF ATOMIC WARFARE

Agenda for the Third Meeting  
to be held at  
Argonne National Laboratory  
6111 University Avenue  
Site B, Conference Room  
Chicago 37, Illinois  
15 and 16 December 1949

OSD1.940706.007

- ITEM 1 — Approval of Minutes of Second Meeting.
- ITEM 2 — Review of Service Programs on Medical Aspects of Atomic Warfare

Attached: BAW 6/2

- ITEM 3 — Program Guidance Report, 1952

Attached: BAW 12/1

- ITEM 4 — Other Business

Attached: BAW 11/1

DECLASSIFIED
AWD 813070
By <u>MLL</u> NARS, Date <u>7/19/94</u>

GHY 17/1 (for panel members only)

BAW 11/2 (for panel members only)

- ITEM 5 — Date of Next Meeting

*James E. McConrack*  
 JAMES E. MCCONRACK, M.D.  
 Executive Director  
 Committee on Medical Sciences

(This document is classified CONFIDENTIAL in accordance with the removal of special access controls)

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12 July 1994  
 RG 330. SECRETARY OF DEFENSE  
 ENTRY 341, RESEARCH AND DEVELOPMENT  
 BOARD RECORDS CONCERNING ORGANIZATION,  
 BUDGET, AND THE ALLOCATION OF RESEARCH  
 AND DEVELOPMENT 1946-1953.  
 Box 265  
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JOINT PANEL ON MEDICAL ASPECTS OF ATOMIC WARFARE

Agenda, 3rd Meeting

ITEM 1 -- approval of minutes of 2nd meeting.

1. Minutes of the Second Meeting have been distributed to all members.
2. The following actions have been taken in regard to implementation of Panel recommendations:
  - (a) In regard to the problem of budgeting for research travel funds (par. 7d, Minutes of 1st Panel Meeting), the Committee on Medical Sciences has transmitted the following recommendation to the Executive Secretary, RDB:

"It is recommended that the RDB be advised of the Committee opinion that lack of funds, which may be utilized for travel by military and civilian scientific personnel in attendance at scientific meetings and in visits to pertinent laboratories, seriously curtails the effectiveness of such scientific personnel and results in delay of research progress and needless waste of R&D funds.

"The Committee therefore recommends that the RDB make suitable representation to the Secretary of Defense looking toward enactment of legislation, if necessary, in order to make funds appropriated for research and development avail-

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## Item 1 Continued

able for travel expense of military and civilian personnel, in the interest of R&D projects, such travel expenses to be taken from funds allocated to the R&D projects in the interest of which such travel is undertaken."

- (b) In regard to Panel recommendations under Item 2 of 2nd Panel meeting, the Committee on Medical Sciences took the following action:

"Endorsed the action of the Joint Panel on Medical aspects of atomic warfare at its 2nd meeting, 7 October 1949, in approving the recommendations of the WPA Medical Advisory Committee with regard to human experimentation, both in principle and according to the suggested protocol for human studies (BAW 10/1) with the stipulation that other phases of research in the medical aspects of atomic warfare (such as thermal burns) should not receive any less emphasis because of the Committee action on this matter."

- (c) In regard to Panel recommendations concerning the next atomic bomb test, the Committee took the following action:

"Approved the action of the Joint Panel on Medical Aspects of atomic warfare in their endorsement in principle of the Joint AEC-Department of Defense Biomedical Program for the next atomic bomb test, as described to that Panel by Captain R. L. Draeger, MD, USN, and as summarized in Log No. 34579."

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JOINT PANEL ON MEDICAL ASPECTS OF ATOMIC WARFARE

BAW 6/2

agenda, 3rd Meeting

ITEM 2 -- Review of Service Programs on Medical Aspects of Atomic Warfare

- attached: (A) MB 8/6- List of Current R&D Projects in Medical Sciences, Classified by Master Plan Technical Objectives, November 1949.
- (B) MB 28/13 - Summary of Estimated Obligations 1949 & 1950 and Budget Estimates for 1951 assigned to OAS, Log No. 34926, dtd 25 Nov 1949.
- (C) Log No. 34925 - Excerpts as follows:
- MB 28/1 Excerpt, Army Justification of Estimates for R&D activities, FY 1951, pages 30-34 of Log No. 33220, May 1, 1949.
  - MB 28/2 Excerpt, Navy R&D Preliminary Budget Estimates for FY 1951 with Estimated Obligations for FY 1949 and 1950, from Log No. 33221, May 1, 1949, pages 19-24.
  - MB 28/2.1 Excerpt, Navy R&D Estimated Obligations for FY 1949 and 1950, Log No. 33221A, page 1, May 1, 1949.
  - MB 28/3 Excerpt, Air Forces Estimates R&D, FY 1951, from Log No. 33222, 1 May 1949.

1. A review of current and planned research and development programs in the field of interest of the Panel is an essential step in the preparation of the Program Guidance Report for FY 1952 (Item 3).

2. At the 2nd Panel meeting, a major part of the Navy program on the medical aspects of atomic warfare was reviewed at the Naval Radiological Defense Laboratory. Arrangements have been made with service members of the Panel to complete the presentation of the Navy program and to present the Army and Air Force programs at this 3rd Panel meeting.

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Encl. 6/2 Continued

3. attachments (A), (B) and (C) are presented as general background information to be used in conjunction with the more specific and detailed information presented by the military members of the Panel.

4. Information concerning related programs of other agencies, such as the AEC and USPHS will be made available insofar as possible. Dr. H. L. Andrews will present a resume of USPHS programs in the area of interest of the Panel. Dr. J. L. Powers will present a resume of the AEC medical and biological program.

(This Item page may be downgraded to Confidential upon removal of the secret attachments)

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THE RESEARCH AND DEVELOPMENT BOARD  
 COMMITTEE ON MEDICAL SCIENCES  
 Washington 25, D.C.

Log No. 34926

Copy No.

MB 28/13

25 November 1949

SUMMARY OF ESTIMATED OBLIGATIONS 1949 and 1950 and BUDGET ESTIMATES  
 FOR 1951, ASSIGNED TO THE COMMITTEE ON MEDICAL SCIENCES  
 (Fiscal Data in Thousands of Dollars...by Depts.)

Tech. Obj.	Department	FY 1949	FY 1950	FY 1951 (low)	FY 1951 (high)
AM-6 (A)	Army	334	466	625	885
	Navy	441	492	640	794
	Air Force	0	0	71	95
	<u>Total D/D</u>	<u>775</u>	<u>958.4</u>	<u>1336</u>	<u>1774</u>
PO-11 (B)	Army	288	219.2	273	545
	Navy	17	10	32	32
	Air Force	182	305	85	89
	<u>Total D/D</u>	<u>487</u>	<u>534.2</u>	<u>390</u>	<u>666</u>
PO-12-(A)	Army	0	0	0	50
	Navy	956	923	1330	1635
	Air Force	405	1226.1	1499	1940
	<u>Total D/D</u>	<u>1361</u>	<u>2149.1</u>	<u>2829</u>	<u>3625</u>
PO-13(A)	Army	728	956	1082	1148
	Navy	443	154	418	551
	Air Force	1.5	48	200	293
	<u>Total D/D</u>	<u>1176</u>	<u>1159.1</u>	<u>1700</u>	<u>1492</u>
PO-14(A)	Army	1328	1542.1	1823	2151
	Navy	466	665.5	337	413
	Air Force	0	0	32	45
	<u>Total D/D</u>	<u>1794</u>	<u>2207.6</u>	<u>2192</u>	<u>2609</u>
PO-15(A)	Army	4	162	109	415
	Navy	22	28.5	42	58
	Air Force	0	0	0.7	1
	<u>Total D/D</u>	<u>26</u>	<u>190.5</u>	<u>152</u>	<u>474</u>
PO-16(B)	Army	1011	679	748	852
	Navy	906	605	562	704
	Air Force	174	1	56	71
	<u>Total D/D</u>	<u>2091</u>	<u>1285</u>	<u>1366</u>	<u>1578</u>
PO-17 SIR-13(C)	Navy			50	52
	Army	221	58.5	249	321
	Navy	3121	185	544	777
	Air Force	46	39.7	127	134
<u>Total D/D</u>	<u>3388</u>	<u>283.3</u>	<u>920</u>	<u>1232</u>	
BR-3 TOTAL:	Navy			648	
	Army	3914	4082.9	4909	6367
	Navy	6372	3711.7	3955	5116
	Air Force	812	1620.7	2251	2869
<u>D/D</u>	<u>11098</u>	<u>9415.3</u>	<u>11115</u>	<u>14352</u>	

Miscellaneous group of programs which Navy considered it could not properly classify under any of the existing PO Technical Objectives.

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Log No. 34925

Copy No.

25 November 1949

ARMY, NAVY AND AIR FORCE  
 PRELIMINARY BUDGET ESTIMATES FOR FY 1951  
 WITH  
 ESTIMATED OBLIGATIONS FOR FY 1949 AND 1950

- attached: LB 28/1 EXCERPT: Army Justification of Estimates for R&D activities, FY 1951, from pages 30-34 of LB 28/1, Log No. 33220, May 1, 1949.
- LB 28/2 EXCERPT: Navy R&D Preliminary Budget Estimates for FY 1951 with Estimated Obligations for FY 1949 and 1950, pages 19-24 of LB 28/2, Log No. 33221, May 1, 1949.
- LB 28/2.1 EXCERPT: Estimated Obligations for FY 1949 and 1950 (Navy R&D). from page 1 of LB 28/2.1, Log No. 33221a, May 1, 1949.
- LB 28/3 EXCERPT: Air Forces Estimates R&D, FY 1951. page 1 of LB 28/3, Log No. 33222, May 1, 1949.

attachment (C) to Item 2  
 3rd Agenda, BAW

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Department of Defense  
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MB 28/1 EXCERPT

ARMY JUSTIFICATION OF ESTIMATES FOR R&D  
ACTIVITIES, FY 1951, from pages 30-34 of  
MB 28/1, Log no. 33220, May 1, 1949

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<u>Internal Medicine</u>	<u>FY 1949</u>	<u>Estimated Obligations</u>		
		<u>FY 1950</u>	<u>FY 1951-A</u> Low	<u>FY 1951-B</u> High
6-60-09-04 - Protein and amine acid \$ ** in liver disease - Com- mission on liver disease- Davidson - Harvard.		\$ 6,282	\$ 3,300	\$ 3,300
6-60-13-09 - Effect of injections of 37,266 nucleoproteins obtained from leukocytes left af- ter preparation of plasma for agranulocytosis - Strumia-Byrn-Mawr hospital.		43,000	46,000	46,000
6-60-13-13 - Chemical and physiologic 23,002 requirements and evalua- tion of blood and blood substitutes-Brooke Army Medical Center.		16,320	25,000	25,000
*** - The prevention, control and treatment of infec- tions and communicable diseases in casualties suffering from thermal burns and/or thermal burns plus radiation in- jury.	0	0	0	55,000
*** - Nutritional requirements of extensive thermal burns	0	0	0	25,000

Basic Medical Science

6-64-06-02 - Radiation effects on aqueous solution.	0	14,355		
6-64-09-02 - Regeneration of the liver- Rawdin-Univ. of Penn.	21,823	21,823	21,823	21,823
6-64-09-04 - Radium chloride-Roofe - Univ. of Kansas.	7,216	7,216	7,216	7,216
6-64-12-14 - Protein metabolism in disease and injury - Lyons-Tulane University.	**	**	51,460	51,460

\*\* Operating on funds from previous fiscal year

\*\*\* Planned Projects

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MB 28/1 EXCERPT CONT.

Title of Appropriation: Medical & Hospital Department, Army - Cont'd.

AW-6 - (Continued)	Surgery	FY 1949	Estimated Obligations		
			FY 1950	FY 1951-A Low	FY 1951-B High
6-59-11-02	- Renal Dysfunction following thermal injury. AFSWP funds.	\$ 24,750	\$	\$	\$
6-59-12-05	- Nutrition and anemia in wound healing - Medical Nutrition Lab.	30,000	31,650	50,000	50,000
6-59-12-08	- Treatment of Burns - AFSWP funds.		10,476		
6-59-12-09	- New methods in treatment of thermal Burns AFSWP funds.		64,774		
***	- The treatment of fractures complicated by extensive thermal burns of the overlying tissue.	0	0	0	45,000
***	- Thermal burns, physiological and biophysical factors involved in fluid transudation from a burnt surface and the development of methods and material for equilibration of fluid movement simulating normal skin without interference with circulation and increasing hazards of infection.	0	0	50,000	50,000
***	- Dead tissue separation in thermal burns, its acceleration and control	0	0	0	25,000
***	- Skin grafting in thermal burn treatment.	0	0	0	30,000
***	- Oxypoly gelatin and dextran as plasma substitutes.	0	0	0	30,000
***	- Planned Projects	2			

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Title of Appropriation: Medical & Hospital Department, Army - Cont'd.

AW-6 - Continued.

	FY 1949	Estimated Obligations		
		FY 1950	FY 1951-A Low	FY 1951-B High
<u>Internal Medicine</u>				
6-60-09-04 - Protein and amino acid \$ ** in liver disease - Com- mission on liver disease- Davidson - Harvard.		\$ 6,282	\$ 3,300	\$ 3,300
6-60-13-09 - Effect of injections of nucleoproteins obtained from leukocytes left af- ter preparation of plasma for agranulocytosis - Strumia-Byrn-Mawr hospital.	37,266	43,000	46,000	46,000
6-60-13-13 - Chemical and physiologic requirements and evalua- tion of blood and blood substitutes-Brooke Army Medical Center.	23,002	16,320	25,000	25,000
*** - The prevention, control and treatment of infec- tions and communicable diseases in casualties suffering from thermal burns and/or thermal burns plus radiation in- jury.	0	0	0	55,000
*** - Nutritional requirements of extensive thermal burns	0	0	0	25,000

Basic Medical Science

6-64-06-02 - Radiation effects on aqueous solution.	0	14,355		
6-64-09-02 - Regeneration of the liver- Revdin-Univ. of Penn.	21,823	21,823	21,823	21,823
6-64-09-04 - Radium chloride-Roofe - Univ. of Kansas.	7,216	7,216	7,216	7,216
6-64-12-14 - Protein metabolism in disease and injury - Lyons-Tulane University.	**	**	51,460	51,460

\*\* Operating on funds from previous fiscal year

\*\*\* Planned Projects

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MB 28/1 EXCERPT CONT.

Title of Appropriation: Medical & Hospital Department, Army - Cont'd.

AW-6 - Continued	FY 1949	Estimated Obligations		FY 1951-B High
		FY 1950	FY 1951-A Low	
<u>Basic Medical Science</u>				
6-64-12-17 - Infused red cells as a source of protein in Man. Medical Nutrition Laboratory.	\$ 10,000	\$ 20,660	\$ 25,000	\$ 25,000
6-88-05-01 - Refrigerator, blood, biological, portable field-Engineering Development Division.	7,200	4,500	4,900	4,900
Sub-total	\$334,260	\$466,060	\$614,211	\$885,127
(AFSWP)		<u>100,000</u>		
TOTAL		\$566,060		

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COMMITTEE ON MEDICAL SCIENCES  
Washington 25, D.C.

25 November 1949

LB 28/2 EXCERPT

NAVY R&D PRELIMINARY BUDGET ESTIMATES  
FOR FY 1951 WITH ESTIMATED OBLIGATIONS FOR  
FY 1949 and 1950

MB 28/2.1 EXCERPT

ESTIMATED OBLIGATIONS FOR FY 1949 and 1950  
(NAVY R&D)

from LB 28/2, Log No. 33221 and 33221a

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MB 28/2

AW-6 Techniques and equipment for solution of medical problems encountered in radiological warfare.

Project No.	Project Title	Allocation of Funds for 1951 "B" Budget	Allocation of Funds for 1951 "A" Budget
<u>Bureau of Aeronautics</u>			
520 503	Radiological decontamination- Methods & equipment - develop- ment & evaluation of.	\$10,000	\$10,000
520 504	Experimental tests and develop- ment of radiological equip- ments and materials.	10,000	10,000
<u>Bureau of Ships</u>			
NS 081-001	Contamination and decontamina- tion studies (Joint Project)	20,000	31,000
NS 081-004	Handling and disposal of radio- active material (Joint Project)	1,000	1,000
NS 086-001	Engineering materials investiga- tion - general (Joint Project)	1,000	1,000
NS 087-002	Analytical procedures and standards - basic dev. studies (Joint Project)	9,000	12,000
<u>Bureau of Yards and Docks</u>			
NY 320-001	Radiological Safety, Hunters Pt.	90,000	100,000
<u>Bureau of Medicine and Surgery</u>			
	Information surveys and prepara- tion of manuals (NRDL)	3,000	4,000
	Future atomic bomb detonation tests. (NRDL)	6,000	7,000
	Airborne contamination research. (NRDL)	1,000	1,000
	Photographic dosimetry techniques and measurements, including (a) energy dependence of film badges and dosimeters.(NaLL)	2,500	4,000

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AW-6 continued

Biological dosimetry, including (b) luminescent bacteria. (NRDL)	\$ 1,000	\$ 1,000
Contamination and decontamination studies. (NRDL)	2,000	2,000
Theoretical studies and calculation on radiation. (NRDL)	2,000	2,000
Instruments, instrumentation and special apparatus. (NRDL)	4,000	4,000
Radiation measurement procedures and standards. (NRDL)	1,500	2,000
Analytical procedures and standards. (NRDL)	6,000	8,000
Practical studies of air-borne contamination. (NRDL)	10,000	10,000
Photographic dosimetry development, including (a) evaluation and development of photographic materials, and (b) extension and usefulness of photographic detectors. (NRDL)	2,500	4,000
Photographic dosimetry application including (a) specification for casualty badges, and (b) x-ray calibration standards. (NRDL)	2,500,	4,000
Chemical dosimeter, including (a) investigation of a calorimeter dosimeter. (NRDL)	5,000	5,000
Properties of radioactive air dispersions, including (a) retention of radioactivity by dust. (NRDL)	3,500	4,000
Practical studies on radioactive air dispersions - gases and vapors, including (a) techniques for evaluation by respiratory protective devices, (b) techniques for the collection and analysis of radioactive air dispersions, and (c) techniques for the collection and analysis of radioactive gases and vapors. (NRDL)	4,000	4,000

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MB 28/2

AW-6 continued

Practical studies of protective clothing, including (a) evaluation of protective clothing--theoretical and (b) evaluation of protective clothing --experimental. (NRDL)	3,000	4,000
Shielding afforded by complex structure. (NRDL)	2,500	3,000
Radioactive air dispersion studies including (a) radioactive contamination of ex-target ship ventilating systems; and (b) hazard from industrial operations on surfaces contaminated by radioactivity. (NRDL)	3,500	4,000
Lethal and sublethal dose studies - acute and chronic exposure to internal radiation, including (a) inhalation studies on radioactive materials; (b) ingestion studies on radioactive materials; (c) percutaneous and ground contamination with radioactive materials; and (d) radiotoxicity of absorbed radioisotopes. (NRDL)	16,000	17,000
Physiological and histological effects of ionizing radiations, including (a) effects of ionizing radiation on hormone systems; (b) role of individual organs in pathogenesis of radiation sickness; and (c) effects of radiation on susceptibility to air-borne infections. (NRDL)	16,000	17,000
Biochemical changes following irradiation, including (a) histo-chemistry of radiation effects; (b) effects of ionizing radiation on intermediary metabolism and nutrition; and (c) effects of ionizing radiation on enzyme systems. (NRDL)	12,000	15,000

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MB 28/2  
 A-6 continued

Maximum permissible dosage manual (NRDL)	\$ 8,000	\$ 8,000
Studies on maximum permissible dosage of radiation; and (b) evaluation of additive effects of various types of radiation. (NRDL)	17,000	20,000
Radiation illness- external, including (a) effects of total body irradiation on fragility of red blood cells; and (b) effects of total body irradiation upon nucleic acids and nucleic proteins. (NRDL)	11,000	12,000
Radiation illness- internal, including (a) development of clinical diagnostic procedures; and (b) applied clinical laboratory procedures determination of natural occurring radiation in normal urine. (NRDL)	4,500	5,000
Influence of pharmacological agents upon the effects of irradiation - internal, including (a) prophylactic and therapeutic measures. (NRDL)	9,000	10,000
Applied physical diagnosis. (NRDL)	5,000	5,000
Biological analytical techniques, including (a) new radioautographic techniques. (NRDL)	4,000	2,000
Clinical radiochemistry manual preparation. (NRDL)	2,000	2,000
Air blast injury studies. (NRRI)	4,000	4,500
Flashburn studies. (NRRI)	12,000	13,000
Cobalt irradiator. (NRHI)	7,000	8,000

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 ENTRY 341, RESEARCH AND DEVELOPMENT  
 BOARD RECORDS CONCERNING ORGANIZATION,  
 BUDGET, AND THE ALLOCATION OF RESEARCH  
 AND DEVELOPMENT 1946-1953  
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 DOD RECC

MB 23/2

AW-6 continued

Mathematical analysis of data from:		
(a) atomic weapons testing		
(b) lethal dose studies		
(c) factors relating animal irradiation experiments to man. (NMRI)	\$ 6,000	\$ 7,000
Preparation for atomic weapons field tests. (NMRI)	70,000	75,000
Atomic weapons field tests. (NMRI)	120,000	135,000
Psychological aspects of atomic warfare. (Literature Survey Only.) (NMRI)	20,000	23,000

Office of Naval Research

	Biological accumulation of inorganic materials by algae.	0	7,000
NR 111 767	Nutritional edema and anemia	0	7,000
NR 112 124	Iron metabolism	10,000	10,000
NR 112 376	Sterility and semisterility in mammals	0	8,000
NR 115 182	Leucopoiesis	4,000	4,000
NR 115 575	Hemolytic anemia	0	5,600
NR 124 015	Plasma protein fractionation as affected by burns from heat and radioactivity	10,000	15,000
NR 131 163	Anti-tissue immune serum.	0	6,000
NR 131 174	Immunological studies on Erythrocytes	0	15,000
NR 170 020	Amplification of fluorescent image	0	15,000
NR 171 294	Radioactive therapy of Graves disease	38,200	33,200
NR 182 704	Metabolism of radioactive fluorine phosphorus and strontium	7,000	7,000
NR 182 738	Radioisotope studies in human enamel	0	10,000
NR 182	Effect of ionizing radiations on saliva	14,000	14,000
NR 182	Development of oral apparatus to detect lethal and sub-lethal doses of ionizing radiations	7,500	10,000

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MB 28/2

AW-6 continued.

NR 182	Influence of nutrition on responses of saliva to ionizing radiations	\$ 0	\$ 8,000
NR 487	(AEC Restricted Data)	50,000	50,000

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DOD RECC

Department of Defense  
 THE RESEARCH AND DEVELOPMENT BOARD  
 COMMITTEE ON MEDICAL SCIENCES  
 WASHINGTON 25, D.C.

25 November 1949

MB 28/2.1 EXCERPT

ESTIMATED OBLIGATIONS FOR FY 1949 and 1950  
 Navy R&D

A-6 Techniques and equipment for solution of medical problems  
 encountered in radiological warfare

Number	Operational Requirement Short Title	Allocations	
		1949	1950
<u>Bureau of Ships</u>			
A-06601	Decontamination	16,000	49,680
<u>Bureau of Medicine &amp; Surgery</u>			
A-06602	Medical Problems	280,000	375,000
<u>Office of Naval Research (Research Group)</u>			
A-06602	Medical Problems	<u>35,000</u>	<u>17,700</u>
	TOTAL	331,000	492,380

~~SECRET~~

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Department of Defense  
THE RESEARCH AND DEVELOPMENT BOARD  
COMMITTEE ON MEDICAL SCIENCES  
Washington 25, D.C.

25 November 1949

MB 28/3 EXCERPT

AIR FORCES ESTIMATES R&D, FY 1951

from page 9 of MB 28/3, Log no. 33222  
May 1, 1949

12 July 1994

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~~SECRET~~  
Department of Defense  
THE RESEARCH AND DEVELOPMENT BOARD  
COMMITTEE ON MEDICAL SCIENCES  
Washington 25, D.C.

LB 28/3 EXCERPT

25 November 1949

AIR FORCES ESTIMATES R&D, FY 1951

A-6 Techniques and Equipment for Solution of Medical Problems  
Encountered in Radiological Warfare

	<u>A Budget</u>	<u>B Budget</u>
<u>School of Aviation Medicine</u>		
Protective skin film, oxygen mask and radioactive filters. . . . .	\$ 5,000	\$ 4,000
Pharmacological studies in treatment of radiation casualties (acute & chronic) . .	4,700	4,000
Techniques and equipment for transportation of radiation casualties by air . . . .	3,000	2,500
Treatment of acute radiation illness . . . .	5,000	3,800
Biological effects of ionizing radiations under conditions of anoxia, cold and heat.	25,000	19,000
<u>Air Surgeon's Office</u>		
Thermal burns encountered in atomic blasts.	<u>50,000</u>	<u>38,000</u>
Total A-6	\$2,700	\$71,300

There were no expenditures for FY 1949 and 1950 by the Air Force with which to compare the above figures.

~~SECRET~~

DECLASSIFIED  
By MD 8/30/70  
7/12/99

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Department of Defense  
THE RESEARCH AND DEVELOPMENT BOARD  
COMMITTEE ON MEDICAL SCIENCES  
and  
COMMITTEE ON ATOMIC ENERGY  
Washington 25, D.C.

JOINT PANEL ON MEDICAL ASPECTS OF ATOMIC ENERGY

BAW 12/1

Agenda, 3rd Meeting

ITEM 3 -- Program Guidance Report, 1952

attached: (a) RDB 200/17

References: (a) RDB 114/6, RDB Calendar, 1950.  
(b) RB 22/3, Guidance for Program Planning in Medical Sciences, 1951.  
(c) RDB 169/3, Master Plan of Research and Development, 1949.

1. Attachment (a) outlines the purpose and method of preparing the Program Guidance Report for 1952. In accordance with reference (a), which was distributed under Item 3 of the Second Panel meeting, this Report must be submitted to the Board on 10 February 1950 for transmittal to the Departments. The Panel's section of this report must be completed at this meeting in order to have it available along with reports from other Panels for the January meeting of the parent committees. At that time, all reports will be integrated and consolidated into a single Program Guidance Report for 1952.

2. Reference (b) which was distributed at the First meeting of the Panel will serve as an example of the general content of the Program Guidance Report in Medical Sciences, although the format for the 1952 report may vary somewhat from the 1951 report. It is suggested that before the meeting, members review reference (b), Guidance for Program Planning in Medical Sciences, 1951.

3. Reference (c) has not been distributed to Panel members, but

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B.L. 12/1 continued

will be available at the meeting. This document is referred to in attachment (4) and will be utilized only in providing very broad, strategic guidance from a military point of view. This type guidance can very readily be incorporated in the Panel's report without prior preparation on the part of the Panel members. The Executive Director will briefly outline this requirement at the meeting.

4. All information presented under item 2 will be utilized in the preparation of the Program Guidance Report. Although no budgetary figures will appear in the report, some budgetary information has been furnished under Item 2, in order to make available some yardstick of relative emphasis among the various programs for the fiscal years 1949, 1950 and 1951.

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aims and requirements and the monetary limitations. It should be based on all the information on programs available to the Committees, and on the guidance furnished by the Master Plan. The RDB Master Plan provides an indication from the military point of view of the relative importance of areas of research and development. However, because of the fact that there are only three levels of importance in the Master Plan, the guidance so provided is necessarily broad. It is expected that the committees will use this broad guidance from the Master Plan and refine it by indicating gradations of importance of programs within areas carrying the same importance rating. The report should include advice as to the appropriate changes in the program, immediate and future, required to insure the proper relative emphasis among the various areas of research and development of interest to the committee. This advice can be expressed in fiscal terms but this is not necessary and may, in many cases, be undesirable. The Committees can use the 1949 Master Plan for the preliminary preparation of this report. By 1 January, the 1950 Master Plan will be available, providing the most up-to-date military guidance, and should be used in the final considerations of the report.

#### 4. Content

As a guide to a pattern of presentation, the following four sections are suggested as suitable parts of the report:

- a. A section discussing the military goals which the program of the committee is designed to fulfill. This section would contain all stated military goals that are available from the Services or the Joint Chiefs of Staff. In areas where no stated goals are evident, the responsible committee should attempt to provide them. These goals should be sorted according to the operational categories of the Master Plan to which they would contribute. Whenever feasible, an indication should be given as to the time at which it is planned that a research and development program will accomplish the goal.
- b. A section containing a discussion of the deficiencies in the present program which will seriously affect the meeting of any of the military goals outlined in subparagraph a. The relative importance of these deficiencies should be indicated.
- c. A section which discusses the present research and development program, with appropriate reference to the following considerations:
  - (1) The improvement in military performance which could result from a particular research and development program. If the successful completion of a given

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research or development program would net only moderate or slight improvement in operational usefulness of the end item, then the relative merits of the program should be weighed and recommendations made accordingly.

- (2) The technical feasibility of meeting military requirements or goals. If the goal appears to be incapable of achievement or requires a high cost in terms of time or monetary support, then the recommendations should reflect these findings and alternative programs considered.
- (3) The probability of successful completion of a program in reasonable time and at reasonable cost.
- (4) The extent to which the program has been coordinated and integrated into a unitary Department of Defense program. This will lead to considerations of duplication of effort and the justification thereof.
- (5) The facilities at which the work is performed, particularly with a view to employing the most effective utilization of all pertinent facilities. Programs which might require the construction of new facilities should be very carefully scrutinized to be sure that they cannot be carried out at already existing laboratories and that the program is of sufficient importance to warrant a new facility.
- (6) The personnel problems encountered in the conduct of research and development effort in the various programs with respect to availability and state of technical competence of personnel.

d. A section containing the conclusions and recommendations concerning new programs which should be initiated to eliminate serious deficiencies in the present program, and modifications of the present program which will provide the maximum support of the military requirements of the program. Recognizing the possibility that the general level of expenditure in the over-all area of committee interest may not be changed, the new programs and modification of present programs should be rated relative to each other so that the most important programs can be chosen to make up the committee over-all program. The recommendation should be as specific and factual as possible.

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BOARD RECORDS CONCERNING ORGANIZATION,  
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5. Format

The information assembled by the committees should be adjusted to fit the particular needs of their respective areas of technical interest. The presentation of the information in each case may not be capable of fitting a uniform format; however, a sample format is attached to show one possible way in which this information could be assembled. The inclusion of the sample format is intended to help define the type of information needed, and to show a possible method of presentation which would serve the Departments and the RDB.

6. Time Schedule

Since the Departments begin their budget estimates soon after the first of the calendar year, each committee is requested to provide Program Guidance Reports in any area which is of interest to it by 10 February 1950.

/s/ R. F. RINEHART  
Executive Secretary

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## SAMPLE FORMAT

1. Military Goals

Relationship of research and development programs to the Master Plan by operational categories, technical objectives involved.

1.1 Immediate goals (next 3 years)

1.2 Future goals (next 3 years)

2. Deficiencies of Present Equipments and Systems in Meeting Requirements

A discussion of deficiencies in available equipment together with an indication of the relative importance of the deficiencies.

3. Present Research and Development Program in Support of Requirements

3.1 Technical feasibility of meeting military operational requirements.

3.2 Military value of expected technical developments resulting from the program. Degree of improvement over available equipment and techniques.

3.3 Probability of successful outcome in reasonable time and at reasonable cost. Note any unreasonable aspects of time and cost.

3.4 Alternative programs, if evident, with their probable comparative value.

3.5 Evidence of duplication, gaps, or work of questionable value.

3.6 Factors which seriously interfere with effective conduct of program - planning, personnel, facilities, money, number employed in program.

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4. Conclusions and Recommendations

Recommendations should be specific and as factual as possible.

4.1 Recommendations as to the evolution of the program; indication of relative importance of areas of research and development; modifications required for (a) FY 1951 and (b) FY 1952.

4.2 Indication of projects or programs which are recognized as justifiable duplication together with a priority listing of those projects in order of promise.

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DO 220 Summary of D...

Department of Defense  
 THE RESEARCH AND DEVELOPMENT BOARD  
 COMMITTEE ON MEDICAL SCIENCES  
 and  
 COMMITTEE ON ATOMIC ENERGY  
 Washington 25, D.C.

JOINT PANEL ON MEDICAL ASPECTS OF ATOMIC WARFARE

Agenda, 3rd Meeting

ITEM 4 — Other Business

A. Further Discussion of the Bio-Medical Program of the Next Atomic Bomb Test

At the 2nd meeting, members of the Panel expressed the desire of discussing further certain aspects of the program presented by Dr. Draeger. Dr. George V. Lekoy will be present for this discussion.

B. Radioactive Contamination of Water and Related Problems

- Attached:
- (A) BAW 11/1, Dr. Dill's Letter, dtd 7 Nov 1949, Log No. 34799
  - (B) GHY 17/1, Quality of Water Supplies with Emphasis on Contamination and Decontamination, Panel on Hydrology, 20 Sept 1949 (for members only).
  - (C) BAW 11/2, Proposed Program for Research in Decontamination of Radioactive Water Supplies for Civilian and Military Use. Joint AEC-Dept. Defense Governmental Agency Conference, 30 June 1949.

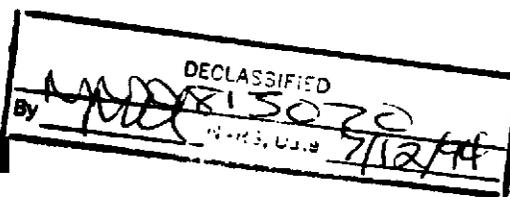
1. attachment (A) has been forwarded to the Panel for consideration.

Attachments (B) and (C) are of related interest and are presented for information.

C. Special reports

- (1) Dr. Nobley L. Evans will report on activities of the Radiological Instrumentation Panel, AFSIP.

(This Item 4 page may be downgraded to Confidential upon removal of Secret attachment)



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Item 4, Other Business continued

- (2) Lt Colonel Frank L. Bauer, Chairman of the Working Group appointed to explore the possibility of the utilization of catastrophes to study problems of mass handling of casualties, will report on the activities of his group.
- (3) The Executive Director will report on recent Committee action taken in regard to allocation of primary responsibility for research programs in the field of effects of atomic explosion. This matter was referred to the Committee on Medical Sciences by the Committee on Atomic Energy.

~~SECRET~~

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Form 211. Bureau for Defense

C O P YMEDICAL DIVISION  
ARMY CHEMICAL CENTER  
Maryland

Log No. 34799

Copy No. 1

BAW 11/1

7 November 1949

SUBJECT: Medical Division Suggestions for Panel Discussion

TO: Army Secretary  
Joint Panel on Medical Aspects of Atomic Warfare  
The Research and Development Board  
Department of Defense  
Washington 25, D. C.

1. It is not certain that the undersigned will be able to attend the next panel meeting. The following matters are suggested for panel discussion:

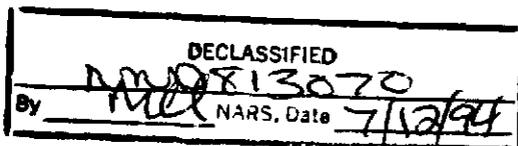
a. The establishment of adequate tolerance dosage limits (civilian and military) for production of potable water from water contaminated with radioactive materials. Inclosure #1 indicates Army interests in this field. The interests of the AEC and of other governmental agencies are being considered by a committee which met this past summer. It reviewed various proposed research programs, particularly that of the Oak Ridge National Laboratory. The minutes of this meeting have not yet been circulated officially.

b. Another group concerned with water supply is the Panel on Hydrology, RDB Committee on Geophysics and Geography. This panel has prepared a report on "Quality of Water Supplies with Emphasis on Contamination and Decontamination", GHY 17/1, Draft 2, dated 20 September 1949.

c. The interests of this Division of the Chemical Corps in water supplies are described in three projects:

- (1) 4-75-03-02 - Kit, Water Testing and Screening.
- (2) 4-75-03-03 - Kit, Water Testing, Poisons.
- (3) 4-75-05-01 - Purification of Water Contaminated by Chemical, Bacterial and Radioactive Substances.

The brief and objective of each is quoted in inclosure #2 from the RDB project cards.

Attachment (A), Other Business  
Agenda, 3rd Meeting  
Jt. Panel on Med. Aspects of Atomic Warfare

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BAW 11/1 -- continued

d. The Chemical Corps has primary cognizance within the National Military Establishment for research and development on methods of dissemination of Radiological Warfare agents. The accomplishment of this mission requires that certain basic biological information be made available to the Chemical Corps. The basic biological information required by the Chemical Corps and considered to be of concern to this panel are summarized in question form in inclosure #3. The Chemical Corps is prohibited from doing the work to obtain the answers to these questions and must look to other agencies for the answers.

2. It will be appreciated if these matters are brought to the attention of panel members in so far as seems appropriate.

FOR THE CHIEF, MEDICAL DIVISION:

/s/  
DAVID B. DILL  
Scientific Director

3 Incls.:

- #1 - Extract of Research Program
- #2 - Description of Med. Div. Projects
- #3 - questions re RW Program

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BAW 11/1.1

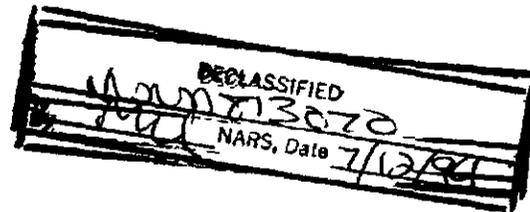
E X T R A C TC  
O  
P  
YA PROGRAM FOR RESEARCH IN DECONTAMINATION OF RADIOACTIVE WATER SUPPLIES  
FOR CIVILIAN AND MILITARY USES

\* \* \*

On the Army falls the heaviest responsibility for military and civilian protection against contamination of water supplies by radioactive materials. The Navy and Air Forces have special responsibility for protecting their own personnel, but in general use equipment developed by the Army or in close cooperation with Army specialists. As submitted by a representative of the Chemical Corps, the responsibilities of agencies of the Department of the Army in connection with programs of purification of water contaminated with radioactive materials have been established as follows:

1. "The Army is responsible for furnishing potable water to troops to include production of potable water from water contaminated by radioactive materials. In the event of failure of civil water purification systems due to radiological contamination the Army will be called upon to furnish stop gap decontamination or purify potable water until such time as civil water purification systems are again effective."
2. Chemical Corps
  - a. The Chief, Chemical Corps, has primary cognizance within the Department of the Army for research and development in the field of offensive (excluding the A Bomb) and defensive radiological warfare to include decontamination. The Chemical Corps is also responsible, within the National Military Establishment, for the development of means of dissemination of radiological warfare agents. The Chemical Corps, in accordance with the above assignment of primary cognizance for radiological warfare, is responsible for the water purification program within the Army for the production of potable water from water contaminated with radioactive material.
  - b. The Chemical Corps, as an extension of its responsibilities for radioactive agents, will be responsible for furnishing information as to the nature and types of radioactive materials which may be found in water contaminated by radiological warfare agents.

Inclosure #1



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BAW 11/1.1 -- continued

- c. The Chemical Corps will determine the adequacy of the available information for the decontamination of water contaminated with radioactive materials and obtain additional information, if necessary.
- d. The Chemical Corps will assist in the evaluation of Corps of Engineer equipment for the purification of water from radioactive materials. It is contemplated that water purification methods, processes and agents to be used in engineer equipment will have to be evaluated on a laboratory scale prior to taking in standard and development engineer equipment. The degree of radioactive contamination before and after contamination will have to be ascertained.
- e. The Chemical Corps will develop and evaluate methods, procedures and materials to decontaminate water supplies from radioactive materials, and possible simultaneously from BW, CW, and RW contamination.

### 3. Corps of Engineers

The Corps of Engineers is responsible for the development and application of apparatus and equipment for the purification of water contaminated by radioactive materials for the production of potable water.

### 4. Medical Department

The Medical Department of the Department of the Army (Surgeon General's Office) should establish for the Army the tolerance dosages or safe limits for radioactive contamination of water supplies.

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BAW 11/1.2

C  
O  
F  
YProjectBrief and Objective4-75-03-02 - Kit, Water Testing  
and Screening

The objective and plan for this project is to incorporate into the present Kit, water Testing and Screening, a practical test for agents of the G series which will indicate clearly whether or not water so contaminated is drinkable without danger to personnel; to improve the sensitivity of the DB-3 contained in the kit, whether in pellets or in some other packaged form; to redesign the container and content spaces to conform with current Medical Dept. packaging standard sizes; and to review, in collaboration with AEC, practical means for detecting radiological contamination.

4-75-03-03 - Kit, Water Testing  
Poisons

The objective and plan for this project is to revise the present kit, based upon the approved military characteristics, in order to correct existing deficiencies. More specifically it is proposed to: (1) Incorporate a suitable test for the nerve gases into the kit; (2) Correct deficiencies of storage and corrosion; (3) Improve the stability of the component reagents; and (4) Improve the carrying strap and change the size of the kit to conform to Medical Department standards. The most satisfactory prototype kit will be sent to the Medical Department for service testing and appropriate classification action.

4-75-05-01 - Purification of  
Water Contaminated  
by Chemical, Bac-  
terial and Radio-  
active Substances

The objective is to develop techniques, treatments, and materials for providing the most effective means of decontamination and purification of water contaminated with chemical, biological, or radiological warfare (radioactive materials) contaminants, to render such water potable within the permissible

Inclosure #2

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BAW 11/1.2 -- continued

4-75-05-01 (con'd)

limits of toxicity. This includes such necessary research for the development indicated as falls within the responsibility of the Chemical Corps. A study of the properties of BW, CW, and RW contaminants in water will be made to find a single field method that will effectively remove all such agents. Standard treatments, material, and equipment for water purification will be investigated and, if these fail, new treatments, methods, and materials will be developed. All available research programs concerned with furnishing potable water to troops will be reviewed and analyzed. It is contemplated that the Biological Department of the Chemical Corps will furnish biological toxicity data, and that collaborative arrangements with the Biological Department will eliminate duplication of effort in the purification of water from BW contaminants. The Atomic Energy Commission is conducting research in the field of RW toxicity, which will be evaluated for removal of radiological contaminants from water down to within the permissible limits of radiological toxicity established for potable water. The purification or decontamination of water from radioactive contaminants involves the necessity for laboratory evaluation of water purification; the effect of these contaminants on water purification equipment and the problems of waste disposal of such contaminants. This project will be closely coordinated with the Corps of Engineers in connection with Engineer Corps water purification equipment, materials, and treatments.

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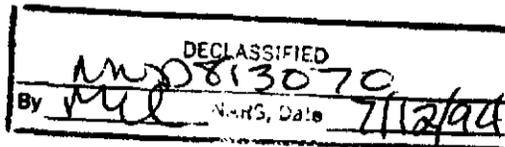
BAW 11/1.3

C  
O  
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YRADIOBIOLOGICAL QUESTIONS ARISING  
IN CHEMICAL CORPS RW PROGRAM

29 August 1949

1. How much external gamma radiation (0.5 to 1.7 MEV) administered within one hour to unshielded troops, by whole body radiation, is necessary to incapacitate approximately 50% of the exposed troops within a period of approximately:

- a. One hour?
- b. One day?
- c. One week?
- d. One month?



2. For the above dosages, approximately how long would incapacitation for combat military duties persist in each case, and which dosages would probably be lethal? If lethal, approximately what percent of the exposed personnel would be expected to die, and how long (range and average) might the fatal cases be expected to survive?

3. How much gamma radiation (0.3 to 1.7 MEV) obtained within one hour by unshielded troops, would be acceptable as a military risk for our own troops:

- a. To result in no decrease of combat efficiency?
- b. To result in some decrease of combat efficiency, not to exceed 10% temporary casualties and with no permanent casualties?

4. How much gamma radiation (0.3 to 1.7 MEV), obtained by airplane crews in 4 to 8 hours, from a partly shielded RW load aboard the plane, would be acceptable as a military risk:

- a. To result in no decrease of combat flying efficiency?
- b. To result in no decrease in flying efficiency during the mission (8 to 16 hours), and not to exceed 10% temporary casualties after completion of the mission, with no permanent casualties?

5. In the two cases of exposed air crews, paragraph 4, how long an absence from exposure to radiation is required before the same men may safely undertake a duplicate mission without increased susceptibility due to former exposure?

6. In the case of repeated exposure of air crews, as above, what is the total reasonable limit of exposure to gamma radiation to still affect neither:

- a. Incapacitation for combat flying during a war period of five years, nor,

Inclosure #3

*[Signature]*  
██████████

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B.W 11/1.3 -- continued

b. shortening of the life span by more than a maximum of about 5%?

7. What length of time can a plane area of indefinite extent, radiating gamma rays (0.3 to 1.7 MEV) at 15 r/day, 30 r/day, 60 r/day, and 120 r/day measured at one meter above the ground, be occupied by unshielded troops:

- a. To result in no decrease of combat efficiency?
- b. To result in some decrease in combat efficiency, but not to exceed 10% temporary casualties?
- c. To result in mild temporary incapacitation of 50% or more of the occupying troops?
- d. To result in severe or lengthy incapacitation of 50% or more of the occupying troops?
- e. Result in about 50% fatalities?

8. Will any fatalities or permanent injuries probably result from the amounts of gamma radiation specified in subparagraphs 7c and d above? If so, approximately what percentage of each might occur among those so exposed?

9. To avoid cumulative effect, what length of time is required for troops, who have been exposed to gamma radiation to lose all increased susceptibility to a subsequent exposure to gamma radiation, so that in a practical military sense, the subsequent exposure will present no greater hazard to them than if they had not been previously exposed? How does this vary with the exposure time and total dose (dose - rate), and with the energy of the gamma ray (0.3 to 1.7 MEV)?

10. Does exposure to gamma radiation significantly increase the susceptibility of troops to BW or CW agents? If so, how much gamma radiation, delivered to unshielded troops in one hour, would be required to double susceptibility to the principal lethal CW agents, and the principal lethal and/or infectious BW agents?

11. What are the relative orders of resistance, qualitatively and quantitatively, of the following body tissues to acute injury by beta radiation, when the radioactive material is placed directly upon them:

- a. Skin (in general).
- b. Thick skin of the palms of the hands and soles of the feet.
- c. Mucous membranes of the nose, mouth, and accessory sinuses.
- d. Lining membranes of the trachea and larger air passages.
- e. The lower respiratory tract.
- f. The tissues of the exterior of the eye, including the eyelids.

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BAW 11/1.3 -- continued

12. What amount (in millicuries) of a non-absorbable beta emitter will produce the following results when ingested by adult human subjects:

- a. No significant gastro-intestinal injury.
- b. Mild gastro-intestinal injury, lasting a few days, in about 50% of the cases.
- c. Severe gastro-intestinal injury in about 50% of the cases.
- d. Fatal gastro-intestinal injury in about 50% of the cases.

13. In the cases specified in subparagraph 12b, above, is it probable that any severe gastro-intestinal injuries or deaths will occur? If so, what percentage of each is probable?

14. In the cases specified in subparagraph 12c, above, is it probable that any deaths will occur? If so, approximately what percent are apt to die, and about how long will they survive before dying? What are the approximate limits of length of disability among the severely injured cases which survive?

15. Does the energy of the beta ray, specified in paragraph 12, above, significantly influence the amount and/or severity of gastro-intestinal injury produced by a given total dose (in millicuries) of radioactive material? If so, what is the approximate quantitative relationship?

16. What is the effect of the degree of dispersion of the beta emitter on the results of paragraph 11? For example, will a given quantity of emitter be more effective in the alveoli as a point source or spread over a considerable surface?

17. What are the acutely lethal quantities by inhalation of a variety of absorbable beta emitters and their compounds?

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The Department of Defense  
Research and Development Board  
COMMITTEE ON GEOPHYSICS AND GEOGRAPHY  
PANEL ON HYDROLOGY  
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20 September 1949

QUALITY OF WATER SUPPLIES  
WITH EMPHASIS ON  
CONTAMINATION AND DECONTAMINATION

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## 1. INTRODUCTION

1.1 Purpose

The purpose of this study on quality of water with emphasis on contamination and decontamination is to indicate deficiencies in research and development programs in this field of hydrology and to make recommendations to the Research and Development Board to the end that action may be taken to advise the Secretary of Defense, the interested Boards and Departments of the Department of Defense, the National Security Resources Board, the Atomic Energy Commission and all other interested Federal Agencies of such deficiencies with recommendations for their correction.

1.2 Scope

The scope of this study will cover the quality of water supplies to the various facilities owned, operated or controlled by the Department of Defense with emphasis on possible contamination by an enemy in wartime or by sabotage in peacetime and the decontamination of waters so contaminated.

The ordinary contamination of water supply system by physical or mechanical failure of parts of the system, by depletion of reserve storage, or by over extension of service is not considered in this study since existing detection and disinfection practices and proper operating procedures provide reasonable safety under these conditions.

The contamination of water for agricultural purposes is considered to be relatively unimportant since the tremendous acreage in this Nation in such use would tend to limit the affected areas to a small percentage of the whole.

1.3 Method of Assembling Data

Data for this study have been assembled principally through conversation with informed persons. In view of the complications introduced into a study on quality of water from a hydrological point of view by the potentialities of chemical, bacteriological and radiological warfare contaminants, the Committee on Geophysical Sciences, by restricted letter of its Executive Director dated 20 October 1948, enlisted the assistance of other Committees of the Research and Development Board interested in these contaminants.

By mutual consent of the representatives of the several committees, nor formal meetings were held. Information received from these sources, together with that received from representatives of the Atomic Energy Commission, the National Security Resources Board, the Munitions Board and others, provides the basis for this study.

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#### 1.4 Summary of Recommendations

It is recommended that the Research and Development Board advise the Secretary of Defense, interested Boards and Departments of the Department of Defense, the National Security Resources Board, the Atomic Energy Commission and all other interested Federal Agencies

- 1.4.1 that research and development programs necessary to overcome deficiencies revealed in this study be immediately initiated and energetically carried on
- 1.4.1.1 to discover and develop a test or tests for rapidly and accurately detecting in a water supply the presence and amount of contamination by any chemical, bacteriological or radiological material
- 1.4.1.2 to investigate the effectiveness of the various existing standard water treatment processes for decontaminating a water supply contaminated by any of the various radiological materials
- 1.4.1.3 to discover and develop new simple and effective methods for removing radiological contamination from water supplies contaminated by any of the various radiological materials
- 1.4.1.4 to investigate the effects of atomic blasts in air, underground and underwater, with the fission products produced therefrom, on recharge areas of underground water supplies; on rivers storage reservoirs and transmission mains of various materials; and on any other major part of a water supply system.
- 1.4.2 that the results of the research and development obtained from the preceding recommendation be made available, in so far as the national security permits, to the U. S. Public Health Service, the State Health Authorities, any authorized civil defense organization, superintendents and operators of municipal and privately owned water supply systems furnishing all or part of the water required by any facility of the Department of Defense.

## 2. DISCUSSION

### 2.1 Necessity for Water of Good Quality

An adequate supply of water of satisfactory quality is essential not only for the peacetime economy of the country, but also for waging a modern war successfully. Without an abundant supply of good water, cities or concentrations of population cannot exist; industry cannot produce the needed materials and equipment, and agriculture cannot meet the requirements for food production.

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## 2.2 Use of Water

The installations, facilities and manufacturing establishments owned, controlled or operated by the Department of Defense consume water in practically every conceivable manner for domestic, industrial and agricultural purposes.

## 2.3 Contamination of Water

Ignoring the usual peacetime contaminations of a supply system water supplies to facilities of the Department of Defense may be contaminated in peacetime by sabotage and in wartime by enemy action. Chemical, bacteriological and radiological materials may be introduced into water systems through airborne bombs, rockets, guided missiles, artillery shells or sabotage. Surprise attacks are to be expected in any future war. Contamination may therefore occur without warning. Rapid means of detecting contamination and concentration are imperative for adequately protecting the Department of Defense facilities.

## 2.4 Standards of Water Quality

The quality of water supplied to facilities of the Department of Defense should meet the specific requirements of the use to which the water is put.

Domestic water should be of a quality that will meet the requirements of the U. S. Public Health Service "Drinking Water Standards, 1946," or such modifications thereof as may be made by competent medical authority.

Industrial water for cooling or similar purposes should be of a quality that will not adversely affect the heat exchange system or other equipment by corrosion or by micro-biological or scale deposits. Industrial water for processing should be of a quality that will meet the specific requirements of the particular product manufactured.

Agricultural water for agriculture and stock-raising should be of a quality that will promote growth of crops without deleterious effects and will be harmless not only to the stock, but also to products derived from the stock.

## 2.5 Sources of Water Supply

Water supplies for facilities of the Department of Defense are mainly from ground water and surface sources. In a few cases where such supplies are unavailable or insufficient to meet the requirements a water supply is obtained by distillation or by catchment area with storage.

Municipal or privately owned water systems are preferably utilized wherever an adequate quantity of water of good quality is available at an economical cost. Government owned water supplies are developed when necessary. In theatre of operations areas water is obtained similarly with

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advanced areas supplied by portable or mobile water purification units or by tank truck. Occasionally pipe lines from an acceptable source in the rear to a watering point are employed.

## 2.6 Chemical Contamination and Decontamination

It is possible to neutralize all presently known chemical warfare agents. However, it may not be practicable or economical to neutralize or remove all chemical agents or high concentrations of some types of chemical contaminations. For example in theatre of operation areas where chemical warfare agents may be present, the Armed Forces screen out water that may be so contaminated that the usual field methods of treatment do not produce a water of acceptable quality. This screening is accomplished by means of a detection kit developed by the Armed Forces.

Development of detection procedures for chemical contaminants are continuing. However, the Committee on Chemical Warfare has made recommendations to the Research and Development Board to the effect that the priority of work and effort on chemical warfare detection projects is inadequate and inconsistent with the assigned Adequacy-Promise rating and that priorities assigned to the pertinent projects are too low, especially as regards detection of G gases (nerve gases). The stated recommendation covers detection in the entire chemical warfare field.

The Research and Development Board should direct attention specifically to the need for a rapid and accurate means of detection of the presence and concentration of any and all chemical contaminants.

## 2.7 Biological Contamination and Decontamination

Contamination of water supplies by biological agents is a possibility in any future hostility. Secretary of Defense Forrestal in an article appearing in the Washington Post on March 13, 1949 stated that "active research in biological warfare is being conducted by the United States to enable us to utilize this weapon in the future should it become necessary." He stressed that there was no biological super-weapon today. Mr. Forrestal said "While it would be folly to underestimate the potentialities of biological warfare, there is no factual basis for extravagant claims of a biological super weapon." "Biological warfare would not be instantly destructive of life," the Secretary added, "and it should be appreciated that illness induced by biological agents may be counteracted by specific medical measures. An important defense against biological agents lies in early identification of diseases implanted and prompt institution of appropriate countermeasures to prevent further spread and restore the health of those affected."

The Chief of the Army Chemical Corps, in the same article, declared that at this time "We are working on or have a defense against every type of biological warfare."

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or concentration of bacteriological contamination of water supplies.

The Research and Development Board should therefore direct attention to the need for a rapid and accurate method for the detection of the presence and concentration of any and all biological contaminants in water supplies.

## 2.8 Radiological Contamination and Decontamination

Since the first successful demonstration of nuclear fission, the entire world has been attempting to learn the secret of its accomplishment and to discover the best means of protecting themselves from so tremendous a force should it be used against them. Prior to this successful demonstration relatively few persons were exposed to harmful radiation from radiological materials. Subsequent to the demonstration, large numbers of people might, under extraordinary circumstances, be subject to exposure to radiation from the operation of plants manufacturing fissionable products, from the operation of research laboratories working with radioactive isotopes and from the possible action of enemies having possession of radiological material.

Contamination of water supplies by radiological agents is a matter of grave import to this Nation. Many of the industrial facilities of the Department of Defense are located in comparatively few concentrated areas where, under war conditions, water supplies might be particularly susceptible to radiological contamination.

Much thought has been given by many competent scientists on the probable effects of radiological materials on water supplies. However, as of this date, no research and development programs for proving these thoughts and surmises are being carried on although a program is presently under consideration. Research and development programs for the treatment of waters from plants manufacturing radiological materials have been carried on and are continuing to the end that the quality of water supplies in the vicinity may not be adversely affected. The lack of specific knowledge as to the effects of radiological contamination on water supplies and the inadequacy of present methods of water treatment for removing such contamination would prevent the taking of effective countermeasures in the event of an emergency.

The Research and Development Board should direct attention to the need in the field of quality of water

- (1) for discovering and developing a test or tests for rapidly and accurately detecting the presence and concentration of radiological materials, including fission products, in water supplies

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- (2) for investigating the effects of atomic blasts in air, underground and underwater on recharge areas of a ground water supply and on rivers, reservoirs, transmission mains and other major parts of a water supply system
- (3) for investigating the effectiveness of the various existing types of water treatment processes in removing radiological contamination from water supplies and
- (4) for modification of existing procedures or developing new simple and effective methods for removing radiological contamination from water supplies should the existing methods prove to be ineffective.

## 2.9 Dissemination of Information

Any attack on the United States by an enemy employing radiological agents would probably be a surprise attack. Centers of industrial concentration would seem to be the object of an attack. There would be little time to instruct the superintendents and operators of water supply systems furnishing water to the facilities of the Department of Defense in methods of detecting and decontaminating radiological materials. Much of the instruction would be accomplished by the U. S. Public Health Service and the State Health authorities who would undoubtedly have large parts in protecting civilians in the event of an emergency as they have in the past. Any civil defense organization authorized for a wartime emergency would also have a prime interest in instructing water supply personnel.

The Research and Development Board should direct attention to the need for the dissemination to the extent permitted by national security of the information and methods and procedures for the detection and decontamination of chemical, biological and radiological materials in water supplies derived from research and development programs recommended herein to the U. S. Public Health Service, to the state health authorities, to the civil defense agency authorized for a national emergency and to superintendents and operators of water supply systems furnishing water to the facilities of the Department of Defense.

## 3. SUMMARY

3.1 It is recommended that the Research and Development Board advise the Secretary of Defense, the interested Boards and Departments of the Department of Defense, the National Security Resources Board, the Atomic Energy Commission and all other interested Federal Agencies that a study on quality of water with emphasis on contamination and decontamination has revealed that deficiencies and inadequacies exist in research and development programs in the field of hydrology and that research and development programs should be initiated immediately and energetically carried on to

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- 3.1.1 Discover and develop a test or tests for rapidly and accurately detecting the presence and concentration of chemical, bacteriological and radiological contaminants in a water supply
- 3.1.2 Investigate the effectiveness of the various types of existing water treatment processes for decontaminating a water supply contaminated by one or more of the various radiological contaminating materials
- 3.1.3 Discover and develop new methods for decontaminating a water supply contaminated by one or more of the various radiological contaminating materials
- 3.1.4 Investigate the effects of atomic blasts in air, underground and underwater, with the fission products produced therefrom, on recharge areas of ground water supplies; on rivers, storage reservoirs and transmission mains constructed of various materials; and on any other major part of a water supply system.

3.2 It is recommended that the Research and Development Board recommend to the Federal establishments and agencies named in 3.1 above that research and development programs on quality of water in the field of hydrology, as listed in 3.1.1, 3.1.2, 3.1.3, and 3.1.4 above, be immediately initiated and energetically carried out for the purpose of eliminating the deficiencies and inadequacies revealed by the study on quality of water with emphasis on contamination and decontamination.

3.3 It is further recommended that the Research and Development Board urge the Federal establishments and agencies named in 3.1 above to make available in so far as the national security will permit the results of the research and development programs recommended in 3.1.1, 3.1.2, 3.1.3 and 3.1.4 above to the U. S. Public Health Service, the health authorities of the various states, any authorized civil defense organization and the superintendents and operators of municipal and privately owned water supply systems furnishing all or any part of the water required by any facility of the Department of Defense.

#### 4. CONCLUSION

Rapid and accurate procedures for detecting the presence and concentration of chemical, biological and radiological contamination in water supplies are urgently required so that countermeasures may be taken to protect the health of the Nation. Methods and procedures for the decontamination of water supplies contaminated by chemical, biological and radiological materials are essential to the health of the people and the productivity of the country. The application of these tests for detecting the presence and concentration of contamination in water supplies and of these methods for the decontamination of water found to be contaminated demands that knowledge of such tests, procedures and methods be disseminated to the personnel responsible for the supervision and operation of water treatment facilities in order that the nation may be prepared for any emergency.

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