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Progress Report to the Joint Committee on Atomic Energy

JANUARY THROUGH MAY 1950

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~~RESTRICTED DATA~~

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By authority of the U. S. Atomic Energy Commission
Per *Lindsley H. Noble* LH Date *May 31, 1950*
Document No. LXXXI—54— 1A

UNITED STATES ATOMIC ENERGY COMMISSION

WASHINGTON, D. C.

MAY 31, 1950

JOINT COMMITTEE ON ATOMIC ENERGY

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PART VI

BIOLOGY AND MEDICINE

(UNCLASSIFIED)

The principal aspects of the Commission's program of biology and medicine to receive emphasis during the next 12 months are:

1. Civil defense liaison activities, including the development of radiation detection instruments;

2. Studies to establish permissible levels of exposure and methods of radioactive waste disposal;

3. Studies of radiation injury and long-term effects of radiation, including the work of the Atomic Bomb Casualty Commission in Japan;

4. Training of health physicists in radiation protection; and

5. Study of the toxicity and metabolism of carbon 14 and tritium.

Civil Defense Liaison

The Commission's program in civil defense was outlined in testimony and statements submitted to the Joint Committee in executive session, February 17, 1950, and in the open hearing, March 17, 1950. Progress in significant phases of the program since then is described below.

Instructor training courses. The Radiological Monitoring Courses at Brookhaven National Laboratory, at the Atomic Energy Project, University of California at Los Angeles, and at Oak Ridge, began in March and April. There were 15 participants in the Brookhaven course, 12 at the University of California, and 21 at Oak Ridge. Similar courses will be given at two additional locations, Reed College, Portland, Oregon, commencing in June, and the Illinois Institute of Technology, Chicago, Illinois, beginning in July.

One-week courses in the Medical Aspects of Atomic Warfare were held at seven locations during March, April, and May and had the following participation:

Institution	No. of students
University of Rochester Atomic Energy Project	30
Johns Hopkins University School of Medicine	23
Argonne National Laboratory	25
Western Reserve University School of Medicine	23

Institution	No. of students
University of Utah School of Medicine	8
University of California at Los Angeles	
Atomic Energy Project	27
University of Alabama	8
Total	144

Emergency radiation control program. Organization and training of the emergency monitoring teams continued under the jurisdiction of the Operations Offices. Allocation of stockpile radiation detection instruments to the teams was nearly completed. The Hanford Operations Office was engaged in assembling standard individual kits to be used by the four teams in that area. The New York Operations Office and the Oak Ridge Operations Office reviewed operating plans and manuals for their respective emergency radiation control programs.

Technical information for the NSRB. The third and last report in the series to be abstracted from the Weapons Effect Handbook was forwarded to the National Security Resources Board on April 14, 1950, for use in their civil defense planning program. Radiation Detection Instruments is the subject of this interim report.1/

Radiation Detection Instruments

In January the Radiation Instruments Branch, Division of Biology and Medicine, was transferred from Oak Ridge to its present location at the National Bureau of Standards, Washington, D. C. This move will facilitate general AEC-wide coordination in radiation detection instrumentation and will permit closer work with the Bureau.

Contacts were made with 38 industrial concerns for the purpose of obtaining their ideas on the development of a simple, inexpensive radiological safety instrument. As a result of these contacts, 27 proposals ranging in cost from approximately $3,500 to $50,000 each were received from 15 companies. These proposals, suggesting the development of 9 different types of devices, are being reviewed and contractual action on several is expected to be initiated.

Six projects for the development of simple, inexpensive radiation detection instruments were being carried on by instrument experts at various AEC laboratories:

1. An ionization chamber instrument about the size of a photographic light meter was developed by the Oak Ridge National Laboratory.

1/ The report was transmitted to the Joint Committee by letter, April 13, 1950.

the end of the year. Initially, the investigations will be on the ability of existing methods of water treatment and purification to remove radioactive contamination from water supplies.

A proposed Columbia River survey was agreed upon by the U. S. Public Health Service and is now under consideration by the Hanford Operations Office. The survey will obtain information on the hydrological, physical, chemical, and biological characteristics of the River as they relate to Hanford plant operation and waste disposal before and after future impoundment of the River by McNary Dam, now under construction. The study is expected to begin July 1 and last two years; the costs are to be borne by the Public Health Service.

Various surveys were initiated at the Reactor Testing Station, among them a meteorological survey by the U. S. Weather Bureau and a geological study by the U. S. Geological Survey, and plans are being made for radioactive background studies. An ecological survey of the White Oak Pond and drainage basin at Oak Ridge was begun in collaboration with TVA.

Health Physics Training

The second group of 21 fellows training in health physics at Oak Ridge and the University of Rochester will complete the regular courses in September, 1950. An additional three fellows were offered an opportunity to take broader training in radiation biophysics, and two are now studying at the University of Minnesota and one at the California Institute of Technology. As an extension of this plan, the Advisory Committee for Biology and Medicine recommended that the AEC establish approximately 20 fellowships for predoctoral training in biophysics.

After the National Research Council withdrew from administration of the AEC predoctoral fellowship program, administration of a national program was undertaken by the Oak Ridge Institute of Nuclear Studies. Arrangements were instituted with Vanderbilt University for its participation in the Oak Ridge part of the program. Graduate credit is offered for course work at both training centers (Rochester-Brookhaven and Oak Ridge-Vanderbilt), and provision is made for selected fellows to take master's degrees upon an extension of the fellowships. From among 194 applicants, 40 fellowships were awarded by the Fellowship Committee, composed of representatives from Rochester and Vanderbilt Universities, Oak Ridge National Laboratory, Oak Ridge Institute of Nuclear Studies, and the AEC. This group will begin their training in the Fall of 1950.

Cancer Research Plans and Facilities

Argonne Cancer Research Hospital. The contract between the University of Chicago and the Atomic Energy Commission for operation of the Argonne Cancer Research Hospital and the contract for the lease of the property to the University of Chicago were signed. Bids for construction of the Hospital are now being taken and an award is scheduled for June.

Oak Ridge cancer research unit. Construction of the cancer wing at the Oak Ridge Hospital was completed, and the unit was equipped and ready to receive patients at the end of May. A plan for the initial cancer research activities was established and includes among other studies the following:

1. The use of radiogallium in the treatment of experimental and, later, human cancer;

2. The properties of radioruthenium in the treatment of surface tumors;

3. The use of radiomanganese in the treatment of thyroid tumors;

4. The action of antimony compounds in cancer by radio tracer techniques; and

5. The development and design of a telecobalt therapy unit to use a thousand curie source when this becomes available. The project is being carried on in conjunction with the Post-Graduate School of Medicine, the University of Texas, and the M. D. Anderson Hospital for cancer research.

Research Proposals Approved

A list of the research proposals approved by the Division of Biology and Medicine during the period January through April, 1950, is shown in Appendix D. (End of UNCLASSIFIED section.)

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Appendix A

Table 1. - COSTS INCURRED - BY PROGRAMS

(Millions of dollars *)

	Fiscal year 1949	Fiscal year 1950 July-Sept. 1949	Oct.-Dec. 1949	Jan.-Mar. 1950	Total (nine months)
OPERATING PROGRAMS					
Source & Fissionable Materials	$108.7	$23.5	$36.0	$24.9	$84.4
Weapons	90.7	22.5	20.5	22.2	65.2
Reactor Development	17.0	6.1	6.5	8.7	21.4
Physical Research	26.2	7.1	6.5	8.0	21.6
Biology and Medicine	14.7	3.9	4.2	4.5	12.7
Community Operations	14.5	1.3	1.6	1.6	4.5
Program Direction and Administration	21.7	5.4	4.8	5.3	15.5
Subtotal-Operating Programs	$293.5	$69.8	$80.2	$75.2	$225.3
PLANT AND EQUIPMENT					
Production Facilities	$158.5	$20.9	$25.1	$24.6	$70.6
Research Facilities	85.2	16.7	27.0	21.5	65.2
Community Facilities	69.1	18.7	9.4	4.4	32.5
Administrative Facilities	1.5		.3		.3
Multi-purpose Facilities	23.6	3.4	5.2	4.5	13.0
Changes in Undistributed Construction Costs		(2.9)	1.1	(1.5)	(3.3)
Subtotal-Plant and Equipment	$338.0	$56.8	$68.1	$53.5	$178.4
Total-Operating and Plant and Equipment Programs	$631.5	$126.6	$148.3	$128.7	$403.6

(*) Detail may not add to total due to rounding.

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Appendix A (continued)

Table 2. - COSTS INCURRED - BY OPERATIONS OFFICES

(Millions of dollars *)

Operations Office	Fiscal year 1949	Fiscal year 1950 July-Sept. 1949	Oct.-Dec. 1949	Jan.-Mar. 1950	Total (nine months)
OPERATING PROGRAMS					
Chicago	$ 19.4	$ 5.7	$ 5.9	$ 6.4	$ 18.0
Hanford	37.7	7.6	9.5	10.1	27.2
Idaho		.1	.1	.3	.5
New York	28.3	7.9	6.5	6.7	21.1
Oak Ridge	71.0	15.7	14.7	14.7	45.1
Santa Fe	76.3	21.6	18.2	20.6	60.4
Schenectady	6.5	1.7	2.9	3.9	8.6
Raw Materials	26.4	6.2	16.4	7.1	29.7
Washington	27.9	3.4	5.8	5.3	14.6
Subtotal-Operating Programs	$293.5	$69.8	$80.2	$75.2	$225.3
PLANT AND EQUIPMENT					
Chicago	$ 24.3	$ 5.8	$ 6.6	$ 5.8	$ 18.2
Hanford	152.3	8.0	7.7	7.1	22.8
Idaho	.2	.1	.7	1.4	2.2
New York	25.2	3.8	4.6	3.0	11.3
Oak Ridge	45.8	13.2	10.5	12.1	35.8
Santa Fe	48.8	19.7	29.7	18.3	67.8
Schenectady	16.9	2.6	3.0	1.7	7.4
Raw Materials	1.8	.5	.2	.1	.8
Washington	22.7	3.2	4.9	4.0	12.1
Subtotal-Plant and Equipment	$338.0	$56.8	$68.1	$53.5	$178.4
Total-Operating and Plant and Equipment Programs	$631.5	$126.6	$148.3	$128.7	$403.6

(*) Detail may not add to total due to rounding.

Appendix B

CONSTRUCTION PROGRESS SCHEDULES FOR PRINCIPAL TECHNICAL FACILITIES
AS OF MARCH 31, 1950

Project		Status of construction at end of each quarter (percent) 1949 2nd	1949 3rd	1949 4th	1950 1st	1950 2nd	1950 3rd	1950 4th	Currently estimated construction dates Start	Complete	Estimated cost 1/ (000's)
FISSIONABLE MATERIALS FACILITIES											
St. Louis											
Mallinckrodt Chem. Works Green Salt Plant 7 #....	Actual	0	0	0	25				Feb. 1, 1950	Aug. 30, 1950	$ 1,800
	Scheduled	0	0	0	25	97	100				
Oak Ridge											
K-29 Plant.....	Actual	0	2/	8	28				Aug. 29, 1949	June 30, 1951	67,000
	Scheduled	0	2/	5	27	30	50	76			
K-31 Plant.....	Actual	0	0	2/	2/				Dec. 9, 1949	Nov. 1, 1952	162,400
	Scheduled	0	0	2/	2/	5	10	15			
UF6 Plant #.....	Actual	0	0	2/	31				Dec. 19, 1949	Aug. 1, 1950	2,000
	Scheduled	0	0	2/	29	95	100				
Hanford											
DR Waterworks.....	Actual	0	0	0	14				Dec. 19, 1949	Oct. 1, 1950 *	25,564
	Scheduled	0	0	2/	14	44	100				
WEAPONS											
Los Alamos											
Radio-Chem. Lab. (CMR-10).	Actual	0	5	20	33				July 18, 1949	Nov. 30, 1950 *	3,152
	Scheduled	0	2	33	60	65	85	100			
Accelerator Building.....	Actual	0	30	78	69 3/				June 15, 1949	Aug. 1, 1950 *	1,810
	Scheduled	2/	17	100	100	95	100				
Van de Graaff Lab.....	Actual	1	26	50	97				June 15, 1949	Aug. 1, 1950 *	
	Scheduled	1	56	100	100	100					
Experimental HE Fabrication Facilities GMX-3 (132 Bldg., Phase A)....	Actual	0	7	30	83				July 18, 1949	June 13, 1950 *	6,583 4/
	Scheduled	0	4	20	80	100					

CONSTRUCTION PROGRESS SCHEDULES FOR PRINCIPAL TECHNICAL FACILITIES
AS OF MARCH 31, 1950 - (continued)

Project		Status of construction at end of each quarter (percent) 1949 :2nd	:3rd	:4th	1950 :1st	:2nd	:3rd	:4th	Currently estimated construction dates Start	Complete	Estimated cost 1/ (000's)
d) t'd.) ilities	Actual	4	52	91	99				June 3, 1949	May 15, 1950 *	$ 759
	Scheduled	2	60	100	100	100					
eam Plant #.	Actual	0	0	7	11				Dec. 8, 1949	Dec. 31, 1950	3,300
	Scheduled	0	0	5	8	33	86	100			
ilities	Actual	0	22	77	98				July 18, 1949	May 1, 1950 *	1,500
	Scheduled	0	22	88	98	100					
ilding	Actual	2/	7	37	72				May 23, 1949	July 21, 1950 *	4,743
	Scheduled	1	8	39	55	97	100				
#	Actual	0	0	0	2/				Feb. 6, 1950	Apr. 26, 1951	4,068
	Scheduled	0	0	0	3	7	20	57			
Program	Actual	78	78	86	87				Mar. 19, 1948	Sept. 1, 1951	24,950
	Scheduled	78	78	90	89	5/					
CTOR FACILITIES											
Power Lab.	Actual	77	91	97	99				Aug. 1, 1947	May 1, 1950 *	27,000
	Scheduled	81	93	99	100	100					
Power- tor gs. Only)....	Actual	0	0	28	53				Sept. 27, 1949	May 9, 1950 *	560 6/
	Scheduled	0	2/	47	89	100					

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Appendix C

PHYSICAL RESEARCH PROPOSALS APPROVED BY THE DIVISION OF RESEARCH, JANUARY THRU APRIL, 1950

Institution, investigator, subject of research, and estimated annual cost

American Smelting and Refining Co. (A. A. Smith) - Properties of liquid metals - $20,000

Carnegie Institute of Technology (E. C. Creutz) - Nuclear research program with 450 Mev synchro-cyclotron - $475,000 *

Carnegie Institute of Technology (Truman P. Kohman) - Nuclear chemistry - $27,000

Chicago, University of (S. K. Allison) - Biological and chemical research with 35-inch cyclotron - $31,500

Columbia University (T. A. Read) - Diffusionless phase-changes in solid metals and alloys - $27,000

Cornell University (J. H. Hoard) - Structure of fluocarbons and elementary boron - $6,500

Dow Chemical Company (J. C. McDonald) - Properties of magnesium-base alloys - $23,000

Fordham University (M. Cefola) - Use of thenoyltrifluroacetate (TTA) as an analytical reagent - $10,000

Illinois Institute of Technology (A. F. Clifford) - Polonium chemistry and chemistry of acids of hydrogen fluoride system - $10,000

Illinois Institute of Technology (Martin Kilpatrick) - Fundamental chemistry of ozone - $11,900

Illinois Institute of Technology (S. E. Wood) - Properties of non-electrolytic solutions - $12,000

Iowa, State University of (N. C. Baenziger) - Structure of intermetallic compounds - $12,000

Iowa, State University of (James Jacob) - Operation of electrostatic generator - $40,000

Massachusetts Institute of Technology (C. D. Coryell, D. N. Hume, and J. D. Roberts) - Nuclear chemistry - $115,000 *

Massachusetts Institute of Technology (J. C. Slater) - Radiation damage in materials - $28,000

Northwestern University (Fred Basolo and R. G. Pearson) - Substitution reactions of inorganic complexes - $5,100

(*) Represents continued support by AEC, heretofore supported jointly with ONR.

Northwestern University (D. D. DeFord) - Solution chemistry of ruthenium in lower valence states - $7,500

Pennsylvania State College (W. C. Fernelius) - Stability of coordination compounds and related problems - $15,000

Pennsylvania, University of (R. M. Brick) - Thermodynamics of iron-oxygen-sulfur system - $8,000

Pittsburgh, University of (Harry Freiser) - Organic reagents for inorganic analysis - $6,000

Reed College (K. E. Davis) - X Radiation from K- and L-capture - $9,500

Rochester, University of (R. E. Marshak) - Nuclear research with 250 Mev cyclotron - $460,000 *

Tennessee, University of (G. K. Schweitzer) - Low-energy beta particle emission - $4,500

Washington, University of (C. L. Utterback) - operation of 60" cyclotron - $65,000 *

Wichita, University of (Luther Lyon) - Techniques for measurement of surface area of powders - $10,000

Wisconsin, University of (W. J. Blaedel) - High frequency titrations - $5,400

Yale University (J. M. Sturtevant and Louis Meites) - Polargraphic diffusion current - $12,000

Note: Each of the above projects is for Unclassified work.

(*) Represents continued support by AEC, heretofore supported jointly with ONR.

Appendix D (continued)

Minnesota, University of (Dr. W. D. Armstrong) - Effect of ionizing radiation on electrolyte and water metabolism - $47,174

Minnesota, University of (Dr. G. E. Moore) - The study of methods and instruments to improve the localization of radioactive materials in the body; with special reference to the diagnosis of brain tumors - $22,713 *

Minnesota, University of (Dr. Samuel Schwartz) - Synthesis of hemoglobin in bone marrow and maturation and multiplication of blood cells - $20,738

Minnesota, University of (Dr. C. J. Watson) - The influence of radiation and chemically induced bone marrow injury upon porphyrin injury - $18,630

Montefiore Hospital, New York City and Polytechnic Institute of Brooklyn (Drs. Daniel Lazzio and K. G. Stern) - The relationship of stable and radioactive lanthanum to nucleic acid synthesis in normal and neoplastic tissue - $30,000

New England Deaconess Hospital, Boston, Mass., (Drs. S. P. Hicks, M. W. Holt, S. O. Sommers, E. H. Thompson, and S. W. Warren, Scientific Advisor) - Acute radiation injury - $15,400 plus overhead.

New York University - Bellevue Medical Center (Dr. M. B. Sulzberger) - Skin changes produced by low voltage roentgen ray irradiation - $6,480 *

North Carolina, University of (Drs. J. C. Andrews and M. K. Berkut) - Tracer studies and irradiation in dental metabolism - $4,500

North Carolina, University of (Dr. Arthur Roe) - Carbon 14 research - $4,300 (15 months) *

North Carolina, University of (Drs. C. D. Van Cleave and C. T. Kaylor) - Radioautographic study of distribution and retention of beryllium in the rat - $18,533 *

Northwestern University (Dr. J. G. Bellows) - Studies on radiation cataract - $24,000

Ohio State University (Dr. J. L. Morton) - Physical and medical principles in the therapeutic use of radiocobalt 60 - $25,000

Oklahoma, University of (Dr. S. H. Wender) - Isolation and identification of flavonoid pigments of use in the control of radiation injury - $12,000

Oregon University of, Medical School (Dr. E. S. West) - Studies on metabolism - $17,604 *

Pittsburgh, University of (Drs. Campbell Moses and A. J. Allen) - Effects of neutrons from a cyclotron on mammals, with particular reference to the development of cataracts - $16,537

Rice Institute, Houston, Texas (Dr. Roy V. Talmage) - Studies of the influence of adrenocortical and other hormones on electrolyte balance - $17,400 *

(*) Renewal of project.

Tennessee, University of (Dr. E. F. Williams, Jr.) - Calcium metabolism - $3,000 *

Tennessee, University of (Drs. J. L. Wood and D. H. Sprunt) - The uptake of radioactive sulfur by the lungs of mice infected with swine influenza - $5,200 *

Tennessee, University of (Dr. Lester Van Middlesworth) - (a) Determination of the effects of anoxia on the thyroid gland (b) Study of the metabolism of radioactive methionine in tissues during normal metabolism, in tissues undergoing repair and in radiation tumor - $4,350 *

Tennessee, University of (Drs. D. S. Carroll, Jos. Cara, and D. H. Sprunt) - Study of the use of radioactive ruthenium in the treatment of superficial lesions - $3,985

Trudeau Foundation (Saranac Lab.) Saranac, New York (Dr. A. J. Vorwald) - The influence of cortisone upon chronic inflammatory - disease of the lung - $2,000

Tufts College, Medford, Mass. (Dr. David Rapport) - The effect of radiations on reactions associated with growth - $16,200 *

Tulane University (Dr. G. E. Burch) - Study of the turnover rate of chlorine under controlled dietary and therapeutic conditions in patients with congestive heart failure and in control subjects - $3,600

Utah, University of - Basic training course of physicians, nurses, and dentists on the medical aspects of atomic warfare - $1,500

Wake Forest College - Bowman Gray School of Med. (Dr. G. T. Harrell - Distribution and turnover of sodium and potassium in acute infections - $12,831 *

Wake Forest College - Bowman Gray School of Med. (Dr. Camillo Artom) - Formation of tissue phospholipides - $10,590 *

Wake Forest College - Bowman Gray School of Med. (Drs. G. T. Harrell, C. Artom, and D. Cayer) - Toxicity of radiation as related to previous damage and the functional capacity of an organ; the effect of P^{32} and X-rays on liver and marrow - $5,975 *

Washington, University of (Dr. C. A. Finch) - Studies on iron metabolism - $17,800 *

Washington University - St. Louis, Mo. (Dr. W. M. Allen) - Use of gamma ray as a therapeutic agent of carcinoma - $11,124 *

(*) Renewal of project.

Appendix D (continued)

Washington University - St. Louis (Dr. G B. Forbes) - Investigations of electrolyte balance and thyroid metabolism - $8,320

Washington University - St. Louis (Dr. David Lipkin) - The chemistry of nucleic acids, nucleotides and related organic phosphorus compounds - $17,600 *

Worcester Foundation for Experimental Biology, Inc., Shrewsbury, Mass. (Drs. H. Hoagland and G. Pincus) - An investigation of the effects of radiation on the biosynthesis and metabolism of adrenocortical steroids - $68,000

II - BIOLOGY

Battelle Memorial Institute (Dr. K. S. Chester) - Use of radioactive indicators in the study of the mode of action of fungicides - $13,200 *

California, University of (Drs. H. A. Barker and W. Z. Hassid) - Chemical activities of plants and bacteria - $15,900

California, University of (Drs. Roy Overstreet and Louis Jacobson) - The mechanisms of ion absorption by plants - $7,776

Chicago, University of (Drs. E. M. K. Geiling, F. E. Kelsey, and J. M. Beal) - Biosynthesis of radioactive drug compounds - $50,000 *

Connecticut Agricultural Experiment Station (Drs. J. G. Horsfall and A. E. Dimond) - Therapy of plant disease by nuclear radiations - $1,675 (14 months) *

Duke University (Dr. K. M. Wilbur) - Isolation and properties of rat liver nuclei; Shell formation in mollusks as studied by radioisotopes - $7,614 *

Fordham University (Dr. F. F. Nord) - Investigation of enzymatic degradation of native and chemically modified proteins - $13,575

Georgia, University of (Dr. H. W. Schoenborn) - The production of mutant strains of euglenoid flagellates and their use in the study of carbon dioxide fixation processes - $4,985

Harris Research Laboratories, Washington, D. C. (Drs. M. Harris, A. E. Brown, and G. A. Greathouse) - The chemistry of biosynthesized isotopically labeled cellulose and allied polysaccarides - $15,500

Illinois, University of (Drs. R. C. Johnson and H. E. Carter) - Metabolism of vitamins and their interrelationships with amino acids - $4,800

(*) Renewal of project.

Illinois, University of (Drs. H. H. Mitchell and O. F. Kampmeier) - The content in human tissues of eleven trace minerals - $8,500

Indiana, University of (Dr. T. M. Sonneborn) - The specific immobilization substances (antigens) of paramecium aurelia - $8,100

Iowa State College (Drs. J. W. Cowen and Janice Stadler) - A quantitative study of lifetime sickness and mortality and progeny effects resulting from exposure of animals to penetrating irradiation - $293,910 plus overhead (2 years)

Iowa State College (Drs. C. H. Workman and F. Schlenk) - Studies on the metabolism of purine and pyrimidine bases on nucleic acids and nucleotides - $10,500

Johns Hopkins University (Drs. Wm. D. McElroy and C. P. Swanson) - Modification through the use of supplemental environmental factors of the frequency of gene and chromosome changes induced by X-rays, ultra-violet light, and nitrogen mustard - $16,443

Long Island Biological Association, Inc. (Dr. M. Demerec) - Adaptive value of experimental populations exposed to radiations - $29,760 *

Maryland, University of (Dr. J. C. Shaw) - The metabolism of acetate B-hydroxybetric glucose and other carbon compounds in lactating ruminants - $10,000

Michigan State College (Drs. L. F. Wolternick and E. P. Reineke) - Hormonal and nutritional factors which alter the effective half-lives and differential absorption ratios of calcium, manganese, and cobalt in the animal body - $15,120 *

Minnesota, University of (Dr. E. C. Stakman) - The effects of radioactive substances on plant pathogens and other micro-organisms - $31,500 *

North Carolina, University of (Dr. W. C. Gregory) - Peanut seed irradiation project - $17,085 *

Ohio Agricultural Experimental Station (Dr. R. S. Davidson) - Physiology and genetics of plant microorganisms - $3,600 *

Pennsylvania, University of (Dr. D. W. Wilson) - Synthesis of isotopic carbon compounds used in biochemistry - $11,624 ($13\frac{1}{2}$ months) *

Pittsburgh, University of (Drs. M. A. Lauffer and H. T. Epstein) - Correlation of radiation effects with physical and chemical changes in viruses - $12,900

(*) Renewal of project.

Appendix D (continued

Polytechnic Institute of Brooklyn (Dr. Carl Neuberg) - Factors influencing the solubility of heavy metal complexes and their metabolism - $6,480

Purdue University (Drs. H. Koffler and Dorothy M. Powelson) - The comparative biochemistry of molecular hydrogen: I The physiology of hydrogen bacteria - $4,104

Rutgers University (Drs. H. H. Haskin and T. C. Nelson) - Distribution and accumulation of radioisotopes of physiological importance in shellfish - $3,888

Southern California, University of (Drs. H. J. Deuel, Jr., and A.L.S. Cheng) - The effect of radiation on intestinal absorption and metabolism of fats and carbohydrates - $23,382

Tennessee, University of (Dr. Wm. K. Baker) - The influence of oxygen tension on the frequency of X-ray induced mutations and chromosome aberrations in drosophilia - $5,065 plus overhead

Tennessee, University of (Dr. R. R. Overman) - Mechanisms of ionic imbalance and cellular membrane permeability to Na and K in adrenal insufficiency, malaria, and associated pathophysiological studies - $5,200 *

Tennessee, University of (Drs. D. H. Sprunt, C. E. Nurnberger, and A. H. Lipscomb) - Study of the effects of radioactive iodine on patients with carcinoma of the thyroid and with hyperplastic thyroid - $4,245 *

Utah State Agricultural College (Dr. D. W. Thorne) - The use of radio iron in studying lime-induced chlorosis - $6,100

Washington, State College of (Dr. N. Higinbotham) - Rate of movement of ions into and through plant parenchyma tissue as affected by rate of water uptake - $1,944 *

Wisconsin, University of (Drs. R. H. Burris and P. W. Wilson) - Biological nitrogen fixation with isotope tracers - $5,000

Wisconsin, University of (Drs. R. H. Burris, M. J. Johnson, and P. W. Wilson) - Metabolism of organic acids in higher plants and microorganisms - $6,500

Wisconsin, University of (Dr. D. E. Green) - The cyclophorase system of animal tissue - $29,400

Wisconsin, University of (Dr. P. H. Phillips) - Long time effects of intermittant radiations on dogs - $30,458

Wisconsin, University of (Drs. A. J. Riker and J. E. Kuntz - The use of isotopes to ascertain the role of root-grafting in the translocation of water, nutrients and disease-producing organisms among forest trees - $8,748

(*) Renewal of project.

III - BIOPHYSICS

Howard University - Washington, D. C. (Dr. Herman Branson) - Studies with radioactive and stable isotopes - $15,000 *

Illinois, University of (Drs. G. A. Bennett and R. A. Harvey) - Distribution and effect of radioactive calcium and strontium in bone development - $23,620

Massachusetts Institute of Technology (Dr. Rolf Eliassen) - The efficiency of present water treatment methods in removing radioactive substances from water - $44,100 *

Massachusetts Institute of Technology (Dr. K. S. Lion) - New radiation detector - $17,960

Mount Sinai Hospital (Dr. R. Loevinger) - Measurement of tissue dosage delivered by gamma and beta active radioisotopes - $5,100 *

Pittsburgh, University of (Drs. A. G. Kramer, T. F. Hatch, and W. H. Ray) - Hazard from inhaled radioactive particulate matter - $32,560

(*) Renewal of project.

ESTIMATED NUMBER OF SCIENTIFIC AND TECHNICAL PERSONNEL *
EMPLOYED ON THE ATOMIC ENERGY PROGRAM AT SELECTED LOCATIONS

Employer or Installation	1948 1st Q	1948 2nd Q	1948 3rd Q	1948 4th Q	1949 1st Q	1949 2nd Q	1949 3rd Q	1949 4th Q	1950 1st Q
Ames Laboratory	135	170	190	180	160	180	210	210	215
Argonne National Laboratory	440	490	510	530	590	610	630	630	700
Battelle Memorial Institute	100	110	120	140	145	140	130	150	145
Brookhaven National Laboratory	185	220	245	245	245	250	250	285	280
California, University of Radiation Laboratory	420	460	465	460	510	540	550	545	570
Carbide and Carbon Chemical Div. (K 25-27)	900	870	860	860	840	840	725	725	710
Hanford Works (Tech., Health Instrument, and Med. Divs. only)	430	480	530	550	555	560	600	570	550
Kellex Corp.	310	370	480	565	660	570	300	360	290
Knolls Atomic Power Laboratory	200	210	230	250	275	280	290	260	340
Los Alamos Scientific Laboratory	395 #	430 #	410 #	425 #	460 #	510 #	530 #	535 #	540
Mallinckrodt Chemical Co.	50	50	60	60	55	50	85	75	80
Mound and Scioto Laboratories	190	220	220	230	230	235	240	235	235
Oak Ridge National Laboratory (X-10)	600	615	590	570	580	630	620	560	590
Oak Ridge National Laboratory (Y-12)	400	420	440	420	375	350	310	315	320
Rochester, University of	130	130	130	130	120	110	105	110	110
Sandia Laboratory	250	375	550	700	775	800	900	925	1,085
Westinghouse Electric Corp.						65	90	115	190
Other contractors	500	550	600	600	650	635	710	885	900
Subtotal	5,635	6,170	6,630	6,915	7,225	7,355	7,275	7,490	7,850
AEC Scientific and Technical	340	370	420	440	450	480	510	570	585
Total	5,975	6,540	7,050	7,355	7,675	7,835	7,785	8,060	8,435
Total AEC and Contractor Employment (all classes)	61,625	67,247	68,566	68,651	67,452	62,529	58,615	56,610	59,107

(*) Scientific and technical personnel include those employed on operations but not construction, and range generally from laboratory assistants to scientists in supervisory positions but not in top management positions.

(#) Revised estimates.