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BUDGET ESTIMATES

FISCAL YEAR 1961

Department and Laboratories
of
Nuclear Medicine and Radiation Biology

(Contract AT(04-1)-GEN-12)

1170084

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UNIVERSITY OF CALIFORNIA

Department and Laboratories of
Nuclear Medicine and
Radiation Biology

April , 1959

Chancellor R. B. Allen
Administration Building
UCLA Campus

Dear Chancellor Allen,

Transmitted herewith for your consideration and approval are eight copies of the budget for the Department and Laboratories of Nuclear Medicine and Radiation Biology, (Contract AT(04-1)-GEN-12) for the period July 1, 1960 - June 30, 1961 (Fiscal Year 1961). The amount of financial support requested for this period is $2,111,615.00 which will provide for the continuance of the program as outlined in the attached proposal and include added costs related to the occupancy of our new facilities on the West Medical Campus.

This proposal, while submitted for Fiscal Year 1961 (two years in the future), also includes, at the Atomic Energy Commission's request, a recast and explanation of our requirements for the period July 1, 1959 - June 30, 1960, (Fiscal Year 1960), and a rough forecast of our Fiscal Year 1962 financial needs. The Fiscal Year 1960 recast was necessitated by an increase in level of activity for our Department over that included by the Atomic Energy Commission in its Fiscal Year 1960 Congressional Budget Submission. (See enclosed copy of Atomic Energy Commission's letter on the Congressional Budgetary Plan dated February 18, 1959). These changes are also detailed in the attached proposal.

The continuation of Contract GEN-12 is very desirable from the standpoint of both the University and of the Atomic Energy Commission. The increasing involvement of mankind with nuclear energy necessitates continuing and expanding research and education in Nuclear Medicine and Radiation Biology. The Regents of the University and the Atomic Energy Commission have recognized the importance of these endeavors in their development of the agreement to construct the Laboratory of Nuclear Medicine and Radiation Biology and to support its activities during the next twenty-five years. I hope that you will approve of this budget proposal.

If approval is granted, four copies of this proposal should be forwarded to the Manager, San Francisco Operations Office, U. S. Atomic Energy Commission, 518 - 17th Street, Oakland 12, California

Very sincerely yours,

Joseph F. Ross

Joseph F. Ross, M.D.
Chairman and Director

JFR:gkl

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UNITED STATES
ATOMIC ENERGY COMMISSION
San Francisco Operations Office

518-17th Street
Oakland 12,
California

In Reply Refer To:
B:PMC

FEB 18 1959

Dr. Joseph F. Ross, Project Director
UCLA School of Medicine
Department and Laboratories of
Nuclear Medicine and Radiation Biology
10875 LeConte Avenue
Los Angeles 24, California

Subject: FY 1960 UCLA COSTS - CONGRESSIONAL BUDGET

Dear Dr. Ross:

We have received a breakdown of the costs included in the FY 1960 Budget to Congress for the San Francisco Operations Office. The UCLA portion of these costs, by program, is as follows:

Program 6000	
6100 - Radiation Effects on Biological Systems	
6120 - Medical Research	$300,000
6200 - Combating Radiation Detrimental Effects	
6230 - Biological Research	155,000
6300 - Beneficial Applications of Atomic Energy	
6320 - Medical Research	300,000
6400 - Biomedical Problems on Atomic Energy Operations	
6420 - Medical Research	22,000
6480 - Environmental Sciences Research	439,000
Total 6400	461,000
6500 - Dosimetry and Instrumentation	
6560 - Dosimetry	62,000
6570 - Instrumentation	101,000
Total 6500	163,000
6900 - Equipment Not Included in Construction Projects	50,000
Total FY 1960 Operating Costs	$1,429,000

.....(Deletion of Adjusted Items).....

These figures are, of course, subject to change as a result of Congressional action on the AEC budget. We recognize that these figures as they stand are not consistent with your present thinking for FY 1960. Any deviation from these figures in the FY 1960 column of your FY 1961 budget should be fully justified so that the Division of Biology and Medicine may evaluate your needs for additional cost ceiling in detail.

Sincerely yours,

/s/ J. C. Pollard

J. C. Pollard
Assistant Manager

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PROGRAM STATEMENT

Schedule 21, 21a, 21b

COST AND EMPLOYMENT PROJECTIONS

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SCHEDULE 21a
JUSTIFICATION OF OPERATION COST

San Francisco
Operations Office

6000 - Biology and Medicine
Program

Contract AT(04-1)-GEN-12

GENERAL PROGRAM STATEMENT

In July 1958 the UCLA Atomic Energy Project was reorganized as the Department and Laboratories of Nuclear Medicine and Radiation Biology of the UCLA School of Medicine, and a full time departmental chairman and director was appointed. In addition to the research endeavors of the department the objectives of the department were expanded to include the provision of graduate education and training in Nuclear Medicine and Radiation Biology.

OBJECTIVES

The objectives of the department may be summarized in six major interrelated categories:

1. Investigation of the effects of ionizing radiation on systems of biological significance and on living organisms, and studies of ways in which the detrimental effects of ionizing radiation may be minimized or prevented.

2. Investigation of the dynamic aspects of physiological and biochemical processes in man, animals and plants and how these processes are modified by radiation and related pathological states.

3. The development of beneficial uses of ionizing radiation and radioactive substances in medicine and biology.

4. Assessment of the contamination of our environment by radioactive materials; study of the transport of these materials into living orgaisms; and the evaluation of the effects of the accumulation of these substances upon the health, function and structure of these organisms.

5. Additional programs in biology and medicine directed toward solution of special problems occasioned by mankind's use of ionizing radiation.

6. Provision of graduate and post graduate education and training in Nuclear Medicine and Radiation Biology.

SIGNIFICANT ADDITIONS AND CHANGES IN PROGRAM DURING FY 60

During FY 60 we propose four significant changes in our program.

1. The introduction of formal education and training in Nuclear Medicine and Radiation Biology.

   a. The rapidly increasing use of nuclear energy in industry, medicine,

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agriculture, national defense and space exploration necessitates the education and training of increased numbers of scientists and physicians capable of properly exploiting nuclear energy for the benefit of mankind, and of protecting him from its adverse influence.

b. We will provide such training on an advanced level with graduate and postdoctoral students working directly with members of our faculty as research associates. Training of this type not only provides excellent education for the student investigator but also contributes very effectively to the advancement of the scientific program in which the student in involved. Parenthetically the contributions made by investigators of this type are of far greater value than the relatively modest resumeration which they receive.

c. During FY 60 graduate or postdoctoral training will be provided to eight persons.

2. Expansion in the activities of Dr. Taplin of the Nuclear Radiology Division in his development of new and improved applications of nuclear energy.

   a. Dr. Taplin's investigations have been particularly fruitful, resulting in the development of valuable and widely accepted clinical applications of nuclear medical procedures.

   b. We propose the addition of 3 postdoctoral trainees and one technician to work with Dr. Taplin. This will materially increase the contributions in this important area.

3. Studies of the influence of radiation and related pathological states on the interrelated functions of the reticulo-endothelial and hematopoietic systems will be started by J. F. Ross. A laboratory will be equipped and staffed with two postdoctoral research assistants and a technician.

4. The activities of the Environmental Radiation Division will be expanded by the addition of three graduate or postdoctoral research assistants (1½ full time equivalents) to work on problems concerned with the entry into and the influence of radionuclides on plants. Also, it is proposed to increase the effectiveness of this division's collection and analysis of radionuclide contaminated materials by adding six personnel.

ANALYSIS OF PROPOSED CHANGES IN THE BUDGET FOR FY 60

The budget which we propose for support of program 6000 during FY 60 is approximately $274,000 higher than the support for our program suggested in the Congressional Budget Plan for FY 60 (see inclosed letter from San Francisco Operations Office dated February 18, 1959). However, our operating budget for FY 59 (as detailed in our December 9, 1958 budget submission) is $197,000 higher than the Congressional Budgetary Proposal for FY 60. Since our FY 59 budget reflects our present level of activity more realistically than does the Congressional Budgetary Plan for FY 60, the following analysis of our FY 60 budget proposal is compared with our present

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FY 59 budget. Detailed comments are provided with each category summary. General summary statements in regard to our proposal are provided here:

1. COMPARISON TOTAL BUDGET FY 60 AND FY 59: Our proposed budget for FY 60 is $69,000 higher than our operating budget for FY 59 (Including all of category 6000 and 8700 category funds). This increase is attributable to the following factors:

a.	Personnel: Increased 6-3/4 persons		
b.	Salary and Salary Burden:	Increased	$ 35,000
c.	Materials and Supplies:	Increased	48,000
d.	Travel:	Decreased	2,000
e.	Equipment:	Decreased	12,000
		Net Increase	$ 69,000

2. EXPLANATION OF CHANGES:

a. Personnel: An increase of 6-3/4 personnel is proposed. This reflects an increase of 16 personnel involved in "direct investigative activity", but a decrease of 9-1/4 employees involved in "indirect" administrative and technical services. It is important to emphasize that 8 of the 16 "direct activity" personnel will be either graduate students or postdoctoral trainees.

b. Salaries and Salary Burden: The increase of $35,000 reflects the net effect of an increase of $89,000 for salaries of new personnel, an increase of approximately $27,000 attributable primarily to normal salary and promotional actions, and a decrease of $81,000 attributable to reduction in personnel and salaries for the administrative and technical services, and the conclusion of several field operations undertaken during FY 59.

c. Materials and Supplies: The increase of $48,000 reflects a net effect of several counterbalancing items. The most important of these are:

(1) The addition of $17,000 for our Second Conference on Radiobiology (See Category 6120).

(2) The addition of $25,000 to General Operating Expense (M & S) supplanting a separate budgeted section of the Administrative Division (with personnel, salaries, etc.). This change reflects the first step in a proposed reorganization of our accounting activities.

(3) An increase of $11,000 in the Environmental Radiation Division to provide for an increase in normal research activities under Category 6480. In the past some of their costs have been provided by funds from special field programs.

(4) Miscellaneous increases of approximately $19,000 distributed over the laboratory as a whole, some of which will provide support for added staff members.

(5) Offsetting decreases of approximately $24,000 reflecting the completion of several of the field activities undertaken during FY 59.

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d. Travel: The decrease of $2,000 reflects reductions in travel costs as a consequence of the completion of several special field programs undertaken during FY 59. Normal travel funds being requested are $10,000 greater than last year. Of this amount, $6,000 is to provide the Environmental Radiation Division with funds for essential travel in association with continuing collections of materials from established sampling areas. Support for this travel in FY 59 was derived from special field program funds.

e. Equipment: The budget proposes a decrease of $12,000 in equipment funds. Details and justification for specific items are contained in Schedule 21b.

SIGNIFICANT ADDITIONS AND CHANGES IN PROGRAM DURING FY 61

1. Occupancy of our new laboratory building is anticipated in the fall or winter of 1960. This will allow relocation of the Environmental Radiation Division with the rest of the department. Adequate space will be provided for our research and educational endeavors, and will make possible an increase in the number of our graduate students and postdoctoral trainees.

   a. Costs for moving to the new building, for demolition of our present temporary quarters, and the occupancy charge for the new building will add materially to our FY 61 budget, and is reflected by a significant increase in our laboratory indirect costs.

   b. The rental of temporary quarters for the Environmental Radiation Division will be discontinued. However, the charge for this year remains high because of penalty payments for vacating in less than three years.

2. Expansion of the educational and training program will be possible as a consequence of occupancy of the new laboratory. Addition of 13 (8 full time equivalent) graduate students and postdoctoral trainees is proposed. These will be distributed among the divisions as follows:

Category	Division	No. of Grad. Students or Post Doctoral Trainees	Full Time Equivalence
6120	Pharmacology & Toxicology	1	1/2
6120	Radiobiology	1	1/2
6230	Biochemistry	3	1-1/2
6320	Medicine	2	2
6320	Radiobiology	1	1/2
6320	Pathology	1	1
6480	Environmental Radiation	3	1-1/2
6570	Biophysics	1	1/2
	TOTAL	13	8

3. A new program of medical genetics will be added. This will be staffed with two scientists and one technician and will require a modest budget for equipment and supplies.

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4. The nuclear medicine activity will be augmented by an additional postdoctoral research trainee, an additional technician and a laboratory helper.

ANALYSIS OF PROPOSED BUDGET CHANGES FOR FY 61

The proposed budget for FY 61 is approximately $ 2,112,000 an increase of $ 409,000 over the proposed budget for FY 60. $ 275,000 of this increase is due to increased laboratory indirect costs, reflecting the costs of moving ot the new building, demolition of our presently occupied temporary buildings, and the occupancy charges for the new laboratory. Direct research operating costs are increased by $134,000 which results primarily from Salary and Salary Burden costs of 15-1/2 additional personnel.

Detailed comments on proposed changes are provided in our discussion of each category. A general summary statement in regard to the budget is provided here:

1. COMPARISON OF TOTAL BUDGET FY 61 AND FY 60: The proposed budget for FY 61 is $409,000 higher than the proposed budget for FY 60. This increase is attributable to the following factors:

a.	Personnel: Increased 19 persons		
b.	Salary and Salary Burden:	Increased	$ 122,000
c.	Materials and Supplies:	Increased	294,000
d.	Travel:	Decreased	3,000
e.	Equipment:	Decreased	4,000
		Net Increase	$409,000

2. EXPLANATION OF CHANGES

a. Personnel: An increase in direct research activity personnel of 15-1/2 persons is proposed. Of this number 8 (full time equivalents) will be graduate students and postdoctoral trainees, 1 will be a responsible investigator, and the remaining 6-1/2 will be directly supporting technical or clerical personnel. An additional 3-1/2 persons (primarily custodians) will be employed for indirect and supporting activity occasioned by our move to a larger new building.

b. Salary and Salary Burden: The increase of $122,000 is explained as follows:

Expected salary increases (including Salary Burden)	$ 33,000
5 FTE graduate students	25,000
3 postdoctoral trainees	20,000
1 responsible investigator	12,000
5-1/2 technical personnel	31,000
3-1/2 service personnel	13,000
Discontinuance of Project KIWI "A"	- 12,000
NET TOTAL	$ 122,000

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c. Materials and Supplies: The increase of $294,000 is explained as follows:

Occupancy charge - new building	$ 176,000
Demolition of old building	10,000
Moving expense	23,000
Utilities increase	35,000
Radio cobalt source	30,000
Miscellaneous items	20,000
TOTAL	$ 294,000

d. Travel: Costs are expected to decrease by $3,000.

e. Equipment: A decrease of $4,000 in equipment costs is anticipated. Details and justification of specific equipment items are contained in Schedule 21b.

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PROGRAM STATEMENT
DETAILED BY CATEGORY

CATEGORY 6100 - RADIATION EFFECTS ON BIOLOGICAL SYSTEMS

ACTIVITY 6120

Accomplishments in FY 1959

1. In the Pharmacology and Toxicology Division:

   a. Work was published on the increased survival time of radiated animals resulting from treatment with the drug Dithiol.
   b. The local toxicity of organic reactor moderators was studied and the results reported.
   c. Neurophysiological studies were begun on irradiated cats, and changes in central nervous system functions were shown to follow total body radiation of 400 r.
   d. Work was reported on a point beta source irradiator implanted in bone.
   e. Various other drugs were evaluated from the standpoint of protection from neuropharmacology irradiated injury.

2. In the Nuclear Radiology Division:

   a. Radiation protection of mice with 2-aminoethylisothiouranium (AET) was evaluated, and studies on two other protective drugs were initiated.

3. In the Radiobiology Division:

   a. The relationship in irradiated rats between single doses and fractionated doses on life span, tumor production and other late effects has been studied and reported.
   b. Adrenal gland radiation studies in rats has shown the decrease in life span of rats so irradiated.
   c. Four publications were made on the late effects of irradiation.
   d. Studies on the infectious unit (TMA) of tobacco mosaic virus and the effects of irradiation on such units were done and published in two reports during the current year.
   e. Studies on an antibiotic from lactobacillus which may have an influence in radiation survival were completed and reported.
   f. Work on the lipoprotein patterns during embryonic development and the alteration of these patterns in irradiation injury was continued and five reports on this and closely related subjects were made.
   g. Initial work has been done on the growth of bone marrow for future irradiation metabolism studies.

4. Proceedings of the First Catalina Conference on Radiobiology held in September 1957 were edited , are in press and will be published as a book in May, 1959.

Expected Results in FY 1960

1. In the Pharmacology and Toxicology Division:

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a. Work in the therapeutic screening program will continue, principally with the amine oxide derivatives.
b. Studies of the local toxicological effects of organic reactor moderators will be completed.
c. The neurophysiological studies in irradiated cats done last year in the 400 roentgen range will continue at lower levels of radiation exposure. Neurohormonal alteratives in whole body irradiation will be studied.
d. Gastrointestinal metabolic transfer studies in irradiated animals, and point source bone irradiation studies will be completed.

2. In the Nuclear Radiology Division:

a. Work will be done on the effectiveness of therapeutic and protective agents in relation to various dose rates. Previous studies have been made with a single dose of radiation, which is a type of exposure different from the exposure expected to prevail in such situations as fallout.

3. In the Radiobiology Division:

a. There will be a shift in emphasis in the late effects studies from collection of data on the late effects or irradiation, to experiments designed to determine the mechanism of these late effects (i.e. the shortening of life span and tumorgenesis). These studies will involve partial body shielding, parabiosis and radiation of newborn rats.
b. Studies on the radiosensitive unit of nucleoprotein (DNA,RNA) of the tobacco mosaic virus and of poliomyelitis virus will continue.
c. The changes of sulfhydryl groups in normal and irradiated plasma during embryonic development will be determined.
d. The antioxidants present in various cell components of radiosensitive and radioresistant tissues will be studied.
e. Further work on the metabolism of trace elements in relation to irradiation injury is anticipated.

4. The Second Catalina Conference on Radiobiology will be held.

5. The budget required for this category for FY 1960 is approximately $355,000, $55,000 greater than the $300,000 indicated in the Congressional Budgetary plan suggested to us on February 18, 1959. However, this $355,000 request is only $7,000 greater than the operating budget for this category during FY 1959 as detailed in our December 9, 1958 revised budget submission. The additional expenditure proposed for FY 1960 is believed to be well justified. It is occasioned primarily by the inclusion of approximately $17,000 of support for our Second Conference in Radiobiology.

<u>Anticipated Problems in FY 1961</u>

1. No major change in direction or level is anticipated. In Pharmacology

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more effort in the neurophysiological studies is anticipated. A research conference possibly dealing with the effects of ionizing radiation on living organisms is anticipated during this year.

2. The budget request for this category for FY 1961 is $80,000 greater than our request for FY 1960. This increase is explained as follows:

   a. Laboratory indirect costs - $52,000
   b. Direct personnel cost increases - $19,000
      This will provide for expected regular salary increases, will permit appointment of two graduate student research assistants and an additional animal caretaker. The increased animal facilities in the new building will necessitate increased personnel in the animal quarters.
   c. An increase of $3,000 is requested to provide funds for a research conference on the effects of ionizing radiation on living organisms.

CATEGORY 6200 - COMBATTING RADIATION DETRIMENTAL EFFECTS

ACTIVITY 6230

Accomplishments in FY 1959

1. Physicochemical studies have increased our knowledge of the structure of nucleoproteins as represented by tobacco mosaic virus. The effects of the basic proteins, protamine and histone, on human serum have been studied.

2. Investigations of the metabolism and function of the essential fatty acids using Carbon^{14} tracers has resulted in nearly complete elucidation of their metabolism and new theories have been formulated regarding their formation and alterations.

3. The transport of lipids across the cell wall in ascites tumor cells has been studied.

4. The plasma lipids have been studied in irradiated rats on normal and on fat-free diets.

5. Fundamental studies on the effects of ionizing radiation in simple organic molecules such as cyclohexanone have been conducted.

6. Eleven publications have resulted from the above described studies last year.

Expected Results in FY 1960

1. Investigation of the structure and physiological activities of macromolecules and enzymes will continue.

2. Studies of the metabolic role of essential fatty acids will continue with special emphasis on the changes induced by ionizing radiation.

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3. The alteration in lipid metabolism in chronic and acute radiation injury will continue to be studied.

4. Irradiation studies of small molecules with special emphasis on the stability of the hydrogen bond will continue.

5. The budget request for FY 1960 is $158,000, an increase of $3,000 over the Congressional Budgetary plan suggested on February 18, 1959. However, this $158,000 request is actually less by $9,000 than our operating budget for this category for FY 1959 (detailed in the December 9, 1958 budget as $167,000). This decrease is a reflection of a $7,000 decrease in the share of laboratory indirect costs allocated to this category and a decrease of $2,000 in salary and salary burden resulting from a slight decrease in personnel.

Anticipated Problems in FY 1961

1. Studies are expected to continue on the effect of ionizing radiation on simple organic compounds, more complex biochemical components and metabolic processes. The fundamental studies of structure in conjunction with these studies will continue. No major change in emphasis or size of activity is anticipated, although increased emphasis will be placed on the training of investigators at an advanced level.

2. The budget proposed for this program for FY 1961 is approximately $198,000, an increase above the requested level for FY 1960 of $40,000. The major portion of this increase ($28,000) is attributable to the increase in laboratory indirect costs reflecting occupancy of our new laboratory. The remainder of the increase ($12,000) is requested to provide for expected regular salary increases and to make possible appointment of three graduate student research assistants (included as 1-1/2 full time equivalents).

CATEGORY 6300 - BENEFICIAL APPLICATIONS OF ATOMIC ENERGY

ACTIVITY 6320

Accomplishments in FY 1959

1. In the Nuclear Radiology Division:

   a. Clinical studies were continued on the hepatogram and renogram using radioiodine and the results on studies in over 1000 patients were presented at the Second Atoms for Peace Conference at Geneva.
   b. Further evaluation of the Bromsulfeopthalein stress test in the Rose Bengal I^{131} clearance test was done in approximately 200 patients.
   c. Studies of radiostrontium metabolism in animals was continued and Sr^{85} studies in humans with various bone diseases were accomplished and the kinetic studies on human skeletal metabolism were published.
   d. Designs for the Total Body Counter Facility were completed and the major portion of the materials purchased. A prototype small animal total body counter was built and is in successful operation.

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2. In the Radiobiology Division:

   a. The study of the effect of radiation on molecules of biological significance, principally metalloporphyrins were continued and three reports were published in the literature on this subject.
   b. Tissue culture studies of S-3 HeLa and L-mouse cells were conducted and data obtained to show that there is a cell interaction following irradiation but these interactions are limited to the colonies in which the ionizing event has taken place.
   c. The killing efficiency of tritiated thymidine in cultures of E. Coli has been determined and studies are being conducted on the killing efficiency of tritium in bacteriophage.

3. In the Pathology Division:

   a. The preservation of human cells in culture was begun and a more precise description of the morphology of sex chromatin as it appears in cultured amnion was accomplished.

4. In the Medicine Division:

   a. Studies of the causation of leukemia have been successful in transmitting leukemia to new born mice with cell free filtrates and in increasing the incidence of leukemia in certain strains of hybrid mice with purifield DNA prepared from leukemic cells. These findings have been published in Cancer Research.

<u>Expected Results in FY 1960</u>

1. In the Nuclear Radiology Division:

   a. Evaluation of the Rose Bengal Hepatogram in the differential diagnosis of jaundice will continue.
   b. Improvement in renogram techniques using radioiodine labelled miokon will continue.
   c. Clinical evaluation of bone pathology will continue using Sr^{85} tracers.
   d. Animal studies accompanying a, b, and c will continue.
   e. Use of the Total Body Counter in clinical and human environmental radioactive contamination studies should begin during this period with completion of construction of the counter.

2. In the Radiobiology Division:

   a. The effects of radiation on metallo-porphyrin compounds will continue and several other systems which may serve as models for living cells as far as immediate chemical radiation effects are concerned will be studied including substances such as polymers and macrocolocules.
   b. Cell interaction studies following radiation injury will continue to elucidate the mechanism of irradiation injury to genetic material.

3. In the Pathology Division:

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a. Studies of constancy of genetic material in tissue culture will be continued depending to a major extent upon the employment of a Pathologist with this training as the current investigator is leaving the laboratory staff.

4. In the Medicine Division:

a. Studies of the etiology of leukemia will continue with investigation of the possibility of inducing by immunological methods or by radiation, tolerance to the transmissibility of leukemia with cell free and chemically characterized compounds.

b. Studies of the influence of radiation and of other pathological processes upon the rates and magnitudes of certain bodily functions will be initiated. Specifically we will investigate the influence of radiation and cancer on the activity of the reticuloendothelial systems in destroying senescent red blood cells and in making available hemoglobin iron for reutilization in erythrocyte formation.

c. The dynamic aspects of zinc metabolism will be investigated in normal human subjects and in patients with various diseases. A study will be made of ways of modifying radiozinc turnover and its biological life in human subjects.

5. The requested budget for FY 1960 is $410,000, $110,000 greater than the Congressional Budgetary Plan of February 18, 1959, and $117,000 greater than our operating budget for FY 1959. This increase is attributable primarily to an expansion of the activities of Dr. Taplin in developing clinical applications of radioisotope tracer techniques, endeavors that have been particularly fruitful in the past; to the reinstitution of research endeavors by J. F. Ross and to the addition of graduate student research assistants in the Radiobiology Division. We believe it particularly important to begin our program of training of advanced research personnel.

The increase in budget is explained as follows:

a. Direct personnel cost increases - $78,000

(1) Nuclear Radiology - an increase of $42,000 for 6-1/2 FTE to provide:

(a) 3 junior research physicians of postgraduate fellowship caliber plus 1 technician and clerical assistance to work under Dr. Taplin in the development of clinical applications of nuclear energy.

(b) An additional 1-1/2 technicians to sustain the total body counter endeavors.

(2) Radiobiology - an increase of $13,000 to provide for graduate student and research assistants and increased investigative effort in this area (Increase of 2-1/4 personnel).

(3) Medicine - An increase of 2-1/4 people at an increase in cost of $13,000. This provides for a junior research physician, a biochemist and a technician which will enable Dr. Ross to re-establish his research endeavors.

(4) Pathology - an increase of $10,000 to make possible an appointment of a top flight pathologist to replace Dr. Miles who has resigned to accept an appointment at Stanford Medical School.

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b. Materials and Supplies: An increase of $13,000 to support the proposed added staff members.
c. Travel: An increase of $2,000 to provide for travel of added staff members.

Anticipated Problems in FY 1961

1. In the Nuclear Radiology Division:

   a. Endeavors directed toward ridding the body of accumulated Sr^{90} will continue, with the use of the total body counter.
   b. Studies of skeletal metabolic processes employing Sr^{90} and Ca^{45} will be conducted in collaboration with other Medical School departments.
   c. The colloidal radioactive gold technique will be used for assessment of reticuloendothelial function in various human diseases.
   d. The radioisotope procedures for the evaluation of renal and hepatic function will be refined and extended.

2. In the Radiobiology Division:

   a. Study of radiation effects at the molecular and cellular level will be continued, with increasing emphasis on cell culture techniques.
   b. The role of the adrenal in the radiation aging process will be studied and the possibility of modifying the late effects of radiation with exogenous adrenal steroids will be investigated. Studies to detect incipient premature aging in the latent period will be developed.

3. In the Medicine Division:

   a. The role of purified nuclear substances in "transducing" normal cells to malignancy will be continued and the influence of ionizing radiation on this transduction will be studied.
   b. Studies of the functions and interrelationships of the reticuloendothelial and hematopoietic systems will continue.
   c. The metabolic turnover of tissue iron containing compounds and enzymes and the influence of radiation and pathological processes on their metabolisms will be studied.
   d. Studies of radioactive zinc metabolism will be continued

4. The budget request for FY 1961 is $212,000 greater than our request for FY 1960. $100,000 of this increase is in the share of laboratory indirect costs allocated to this category, and $30,000 is for the acquisition of a new 10,000 curie $cobalt^{60}$ radiation source.

   An increase in salary and salary burden of $69,000 is required to make possible:

   a. The establishment of a genetics program in the Medicine Division. This program initially will be staffed with a senior scientist of professional rank, an assistant professor and a technician.

   b. An expansion of the Nuclear Medicine Division by the addition of a physician at the assistant professor level, a technician, and a

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laboratory helper.

c. The addition of 1-1/2 graduate student research assistants or post-doctoral personnel in the Radiobiology and Pathology Divisions.

Materials, supplies and travel necessary to properly support these additional staff members will amount to an added $13,000.

CATEGORY 6400 - BIOMEDICAL PROBLEMS IN ATOMIC ENERGY OPERATIONS

Included in this category are the studies of the Environmental Radiation Division consisting of radioactive fallout soil surveys, fallout contamination of plants and animals, and studies of the biological cycling of fallout radionuclides in plants and animals.

Also included is a small investigation of the pathophysiological effects of blast in the Biophysics Division.

ACTIVITY 6420

Accomplishments in FY 1959

1. The accomplishments in this project since its inception in 1947 were reviewed and presented to the Atomic Energy Commission Ad Hoc Task Unit on Blast.

2. Radioisotopic studies of brain physiology were continued to further elucidate the nature of blast concussion in animals.

Expected Results in FY 1960

1. Further perfection of methods, principally external body radioisotope counting, in the study of the dynamics of blast concussion is expected. Experiments will be done to determine the degree of correlation between concussion and blood-brain barrier changes.

2. The budget for this activity is decreased by $6,000 below the level suggested to us in the February 18, 1959 Congressional Budgetary plan. This also is $6,000 below our 1959 operating budget. The decrease is due equally to a decrease in direct salary costs and to a decrease in the share of laboratory indirect costs borne by this activity.

Anticipated Problems in FY 1961

1. It is planned to shift major emphasis in this program from blast effects to the use of radioisotopes in studying blood-brain barrier changes, possibly in human neurological cases.

2. The budget for FY 1961 is increased over that requested for FY 1960 by $2,000, an increase which is attributable to the increase in Laboratory indirect costs.

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ACTIVITY 6480

Accomplishments in FY 1959

1. The acquisition during this year of supplemental laboratory facilities for the Environmental Radiation Division, has made possible an increased capacity for sample analysis and has reduced the backlog in samples from previous test series and laboratory research activities. About 1000 Sr^{90} analysis and 300 Plutonium analysis on previously collected samples have been completed due to improved laboratory facilities.

2. The following reports have been issued during the year or are nearing completion:

   a. A Granular Collector for Sampling Fallout Debris from Nuclear Detonations.
   b. The Factors Influencing the Biological Fate and Persistence of Fallout.
   c. Distribution and Characterization of Fallout and Airborne Activity from 10 to 160 Miles from Ground Zero, Spring 1955.
   d. Radioecological Aspects of Nuclear Fallout.
   e. Further Evaluation of Balloon Shot Fallout Patterns.
   f. Strontium^{90} and Total Beta Contamination in Eleven Areas in Nevada and Utah as of August, 1958.
   g. Strontium^{90} Content in Bones from Mule Deer and Big Horn Sheep from Environs Adjacent to the Nevada Test Site.
   h. Effect of X-ray on Kangaroo Rats.
   i. Investigation of the Reported Rainout from Shots Diablo and Stokes in Belle Fourche - Rapid City area, South Dakota.
   j. Release of Strontium^{90} and Cesium^{137} from Vina Loam upon Prolonged Cropping.
   k. Influence of Stable Strontium on Plant Uptake of strontium^{90} from Soils.
   l. The Effect of Bicarbonate and Some Other Anions on the Shoot Content of P^{32}, Ca^{45}, Fe^{59}, Rb^{86}, Sr^{90}, Ru^{106}, Cs^{137}, and Ce^{144} in Bean and Barley Plants.
   m. Influence of Calcium on Plant Uptake of Sr^{90} and Stable Sr.
   n. The Influence of K and Cs on the Release of Cs^{137} from Three Soils.
   o. The Organic and Amino Acids in Beans and Avocados Affected by Iron Chlorosis.

Expected Results in FY 1960

1. In the Soil-Plant Factors and Environmental Decay Groups the following will be studied during the year:

   a. Factors influencing plant uptake of radiostrontium and its disposition within the plant.
   b. The plant uptake of reactor waste products applied to soils.
   c. The factors influencing the movement of fission products in the soil and the influence of soil moisture on this movement.

2. The Physiological Ecology Section will continue feeding fallout material collected in Nevada tests to rodents in order to determine the biological

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availability of the radionuclides present in various particle size fractions.

More data will be obtained on the native rodents of Nevada to make possible the better interpretation of biological cycling of fission products in these animals.

3. The Biological and Biophysical Relationship Sections expect to complete their participation in the Kiwi "A" Program and issue reports on the radioactive contamination which may be produced by these devices. It is expected that further reports on the fate and persistence of Sr^{90}, Cs^{137}, and Pu in the Nevada Test Site will be issued and continued documentation of these areas be done.

   Continued characterization from previously collected samples from the Plumbbob Series will also be accomplished.

4. In the Chemical Problems Section it is anticipated that there will be an increased number of samples analyzed for radionuclides in support of the Division activities which will result in additional costs of these activities. Also for continued documentation of previously delineated areas of contamination in the Nevada Test site environs it is anticipated that additional personnel will be needed.

5. A new section on plant biochemistry has been initiated which will study the influence of lime and other soil additives (use to minimize radionuclide assimilation) on the nitrogen and carbon dioxide metabolism of plants.

6. The budget request for FY 1960 is $503,000, an increase of $64,000 over the February suggested financial plan and $47,000 more than our 1959 operating budget (detailed in our December 9, 1958 budget submission). The increase in requested budget over our present operating budget is explained as follows:

   a. Direct personnel cost increase (salaries and salary burden) of $32,000 attributable to:
      (1) Additions of 3 graduate student research assistants (1-1/2 full time equivalent) to the Soil-Plant Factors and Plant Biochemistry Sections.
      (2) A junior engineer to participate in characterizations of radionuclides from fallout and to operate the 30 channel analyzer.
      (3) A scientist to participate in the planning, accumulation and evaluation of fallout information.
      (4) Additional technical personnel to perform chemical analyses of materials contaminated with radionuclides. These technicians are essential to enable the laboratory to keep current in its analyses of materials collected in the field and the samples secured from laboratory activity.

   b. An increase of $11,000 in Materials and Supplies to provide materials needed for analytical procedures and for conduct of laboratory study

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of plant growth activities which in the past have been supported on an interim basis by funds obtained for special field programs.

c. An increase of $5,000 in travel funds to make possible direct support of field ecology studies which are an integral part of the Division's continuing endeavors. In the past this travel has been supported on a "catch as catch can" basis from special funds allocated for field programs.

d. A small saving of $1,000 will be achieved from reductions in the share of laboratory indirect costs apportioned to this Division.

Anticipated Problems in FY 1961

1. No major change in direction of the basic program is anticipated. Some sections' activities, principally the Biological and Biophysical Relationship groups' activities may be influenced by participation in nuclear field tests such as the projected Ploughshare Program.

2. An increase of $71,000 is requested for the FY 1961 budget over the budget requested for 1960. The major portion of this overall increase is a $65,000 increase in indirect laboratory costs resulting from occupancy of our new building. The balance of the increase ($6,000) reflects a minor increase in personnel costs to provide for 3 added graduate student research assistants (1-1/2 full time equivalents).

ATEGORY 6500 - DOSIMETRY AND INSTRUMENTATION

ACTIVITY 6560

Accomplishments in FY 1959

1. Further improvements in the preparation and analysis of single phase aqueous dye trichlorethylene dosimeters has been made leading to improved linearity of response to x and γ-radiation.

2. The thermal neutron response of single phase dosimeters has been enhanced by adding lithium 6 to the dosimeters.

3. Two patents on chemical dosimeters were issued during the year as a result of previous developments of these dosimeters.

4. In the germanium dosimeter program necessary equipment has been built and germanium crystal growing operation begun.

Expected Results in FY 1960

1. Further improvements in the chemical dosimeters are anticipated. Their application to radiobiological research and their usefulness in human radiation therapy will be tested in a joint program with the Therapy Division of the Department of Radiology of the UCLA Medical School.

2. Growing and testing of germanium crystals suitable for neutron dosimetry will continue during this year.

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3. The budget for FY 1960 will decrease by $9,000 from the Congressional Budgetary Plan suggested to us on February 18, 1959. It will also be approximately $10,000 less than our present FY 1959 operating budget. Of this $10,000 decrease, $5,000 is attributable to a reduction in laboratory indirect costs allocated to these activities and $4,000 will result from decreased personnel engaged in dosimetry work.

Anticipated Problems in FY 1961

1. No major change in level or direction is anticipated. The neutron dosimetry program is anticipated to produce a true tissue rep dosimeter during this period

2. An increase in budget of $8,000 is anticipated in FY 1961, primarily resulting from an increase in laboratory indirect cost allocations.

ACTIVITY 6570

Accomplishments in FY 1959

1. A new type converging collimator made of inter-nested tungsten strips was made, tested, and used on patients with a new type photoscanner.

2. Tests were continued on a multicrystal tunnel which proved it to have a high sensitivity and a capacity to handle up to a 20 milliliter sample as compared with the more conventional 2 milliliter well counter.

3. Papers were published on methods of studying cerebral blood flow by scintillator counting and separation of lymphocytes by a new physical technique.

4. A new transistorized D.C. amplifier has been developed by the Electronics Section and further developments on an automatic area monitoring device have been made.

Expected Results in FY 1960

1. Studies on improved scanning techniques will be continued, as well as other studies on scintillation counting.

2. Further studies on a sonic pulse device for possible measurement of tissue aging will continue.

3. Further developments in electronics instrumentation will continue consistent with the current needs of the laboratory research program.

4. The budget requested for this category for FY 1960 is $100,000, $1,000 less than in the Congressional Budgetary Plan suggested to us on February 18, 1959. Our proposal for FY 1960 reflects an increase over our FY 1959 budget of $4,000. This is due to transfer of personnel to this activity who had previously been engaged in neutron dosimetry research.

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Anticipated Problems in FY 1961

1. No major change in direction or level of operation of this activity is anticipated.

2. An overall budgetary increase of $18,000 is requested in this activity for FY 1961. It will cover laboratory indirect costs ($16,000) incident to occupancy of our new building plus the addition of one graduate student research assistant ($2,000) for 1/2 full time equivalent).

CATEGORY 6600 - CIVIL EFFECTS TEST PROGRAM

1. The activities conducted under this category in the past are nearly completed, and as a consequence the budget for FY 1960 is expected to be at a level of $20,00, a decrease of $62,000 from the $82,000 budgeted in FY 1959. However, the FY 1960 request is $20,000 greater than the suggested plan on February 18, 1959, which did not indicate any allotment of funds for this category.

2. Specific details are as follows:

   a. Operation Plumbbob Field Survey decrease $61,000
   b. Operation Hardtack, Phase II Field Survey decrease $4,000
   c. Operation Kiwi "A" increase of $3,000 above the FY 1959 budget.

3. Reports on Plumbbob and Hardtack, Phase II activities have been or shortly will be completed and submitted as UCLA reports and publications.

   It is anticipated that all special field programs will continue to be separately funded as they have been in the past and will not require financial support from our regularly budgeted programs.

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