

REPORT ON

CONTRACT NO. W-7405-ENG-48 ✓

AT
THE

UNIVERSITY OF CALIFORNIA
RADIATION LABORATORY

REPOSITORY Tak Ridge Operations
COLLECTION Records Bldg
Area - Doc 1944-94
BOX No. H-570-9 Bldg. 2714-H
FOLDER 161 Univ. of Calif.
Contract 7405-eng-48

DECLASSIFICATION AUTHORIZED

MALCOLM THEISEN, ANALYSIS
Name (ADD) - Organization

7-29-94
Date 15 NOVEMBER 1946

DECLASSIFICATION RECOMMENDED *gm*

GABRIEL MARCIANTE, DRO CLASSIFICATION OFFICER
Name (ADD) - Organization

7/28/94
Date

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BUDGET AND PERSONNEL SUMMARY

CONTRACT : W7405-eng-48

Type : GFF

Contractor : Regents of the University of California

Description : Research

Life : 1 May 1943 to 30 June 1947

Appropriation : \$25,300,000

Approximate Expense to
31 October 1946 : \$17,868,461

Personnel :

| | |
|---|--------------|
| Director: Professor E. O. Lawrence | |
| Scientific Personnel | : 108 |
| Engineers | : 57 |
| Executives | : 25 |
| Clerical, Drafting, Technical and hourly | : <u>409</u> |
| Total | 599 |

SUB-PROJECT 48A

Allocation : \$177,500

Approximate Expense to
31 October 1946 : \$65,160

Personnel :

| | |
|---|-------------|
| Director: Dr. J. G. Hamilton | |
| Executives | : 3 |
| Scientific | : 19 |
| Engineer | : 1 |
| Technical, Drafting, Clerical and hourly | : <u>24</u> |
| Total | 48 |

SUB-PROJECT 48B

Allocation : \$165,000

Approximate Expense to
31 October 1946 : \$37,400

Personnel :

| | |
|-------------------------------|------------|
| Director: Dr. Wendell Latimer | |
| Executive | : 1 |
| Chemists | : 15 |
| Technicians | : 4 |
| Clerical | : <u>2</u> |
| Total | 23 |

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SUBPROJECT 45C

| | | |
|---|---|---------------------------|
| Allocation | : | \$20,000.00 |
| Approximate Expense to 31 October 1946 | : | \$ 2,127.98 |
| Personnel | : | Director: Dr. R. S. Stone |
| | | Scientific : 1 |
| | | Technical : 1 |
| | | Clerical : <u>1</u> |
| | | Total 3 |

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MAJOR RESEARCH PROBLEMS PRESENTLY UNDER STUDY

UNDER CONTRACT NO. W-7405-ENG-48

I. PROJECT 48

a. 184" Cyclotron: This instrument is now complete and since the first of the month has been successfully operated at low intensity. An internal beam has been detected at approximately 85-inch radius, corresponding to about 200 million electron/volts. Minor operational difficulties have been encountered but successfully solved.

A beryllium target has been exposed to the internal beam and cloud chamber photographs have been taken of the effects of the neutron beam so produced. Several such pictures of interest will be distributed to members of the visiting group.

A large number of concrete blocks, each about a five foot cube, for use in constructing a shielding wall to surround the 184" instrument are now in process of preparation. Tests are also proceeding on various shielding materials and upon the ionisation to be produced in human tissue by the high energy radiation.

b. Linear Accelerator: Most of the material necessary to complete the forty-foot test section of the linear accelerator has arrived and is now awaiting assembly. The 40' resonant chamber is due in a few weeks. The Van de Graaf generator is under construction and it is scheduled for completion about 1 December. The 40' vacuum tank has been tested and a few minor leaks have been found. Present indications are that the accelerating potential of the instrument will be about one million volts per foot.

c. Synchrotron: The Synchrotron building is now about 90% complete. The seventy-ton crane for lifting the magnet yoke has been put in place. Approximately 25% of the wedges for the vacuum chamber have been fabricated. The important problem of fabricating the plastic side-walls of the vacuum chamber seems to have been solved by the manufacturer.

Recent studies of the shielding requirements of the G. E. Betatron indicate that shielding the synchrotron will be a difficult task. As much as ten to fifteen feet of concrete may be required. Special precautions must also be taken to protect personnel and animals outside of the building from the gamma ray beam which will be produced which, unshielded, would be dangerous up to a mile and a quarter.

d. Carbon-14 Work: Considerable research is being undertaken on methods of synthesis of various biologically important organic compounds containing "labeled" carbon in desired locations. These compounds, when prepared, will be used to study the metabolism of normal and

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GABRIEL MARCIANO, ORG CLASSIFICATION OFFICER

Name (ADC) - Organization

Date 2/2/82

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malignant tissues in order to better understand and to treat persons exposed to dangerous amounts of radiation. It is also hoped that the information so obtained may be of considerable value when applied to the treatment and understanding of cancer.

Also under study are the mechanisms of several important preparative reactions, the developments of special synthetic methods necessary for carbon-14 work, and special counting apparatus for the detection of carbon-14.

e. Stable Isotope Separation: A new small calutron unit is nearing completion for use in the preparation of small samples of separated stable isotopes. Such samples are of considerable importance in interpreting many complex nuclear problems such as mass assignments for various activities, the measurements of neutron capture cross sections, etc.

II. SUB-PROJECT 48-A:

a. Under Dr. Hamilton: This project is primarily concerned with determining the metabolism and physiological effects of plutonium^{and} fission products upon humans and animals and with the effect of these materials upon soils and plants. Also under this project is the problem of rendering advice and services to the Navy with regard to the decontamination of ships from Bikini.

b. Under Dr. John Lawrence: This project is primarily concerned with studying the effects of various types of radiation upon specific organs in animals and humans. The method of approach to this problem is to prepare various compounds containing radioactive materials and ^{administer} feed them to animals in which the active material is concentrated in certain specific organs, thereby resulting in the irradiation of these organs exclusively without appreciable effect upon surrounding tissues.

III. SUB-PROJECT 48-B:

Work on this project falls mainly into the following categories:

- a. A study of the general chemistry of plutonium and its compounds.
- b. A study, on a semi-works scale, of a chelation-extraction process for the purification of plutonium from Hanford slugs. This process is showing excellent promise and is being seriously considered for use at the Hanford installation.
- c. A study of the thermodynamic properties of materials of interest in high temperature piles.

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IV: SUB-PROJECT 4B-C:

This project is by far the smallest of the sub-projects and the work is being done at the University Hospital in San Francisco. The work consists of:

a. Careful long-period checks on patients undergoing x-ray irradiations in the normal course of their treatment for various ailments. These checks include determination of the changes in blood chemistry and other physiological effects of the irradiation.

b. The administration of radio-iodine to patients and a study of its uptake, excretion, and physiological effects.

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SUMMARY OF CONSTRUCTION UNDER CONTRACT W7405-eng-48

Upon inception of Contract W7405-eng-48 with the Regents of the University of California, the 184th Area contained the present 184th Cyclotron Building which is the property of the University of California and the present office and machine shop building which was constructed in 1942-43 under OSRD contract. During the period between 1 May 1943 and 1 July 1946, nine buildings were constructed in the 184th Area and alterations or additions were made to the 184th Cyclotron Building and the office and machine shop building at a total cost of \$350,000. This sum was provided from Manhattan District funds.

The buildings constructed during the period 1 May 1943 to 1 July 1946 include:

- a. A two-story chemistry building which originally provided the service chemistry for the calutron program and now houses Dr. Seaborg's work.
- b. An office and laboratory annex which contains the drafting, engineering and patent offices as well as several physical laboratories.
- c. A laboratory and shop building which houses the welding shop and physical laboratories, including at this time the linear accelerator development program.
- d. Shops for pattern and assembly work, foundry and sheet metal work, carpentry and paint work and warehousing.

Just prior to 1 July 1946, a Constructive Directive was issued for a building to house the synchrotron which facility is to be complete and in operation by 1 March 1947. The anticipated cost of the building is \$60,000. The building is now essentially complete.

Since 1 July 1946, five additional Constructive Directives have been issued to cover the following construction program:

- a. Construction of new carpentry and paint shops in the Wilson Tract so as to free the present carpentry shop for use as the site of the IC Magnet which is now being moved. The estimated cost of this construction is \$20,000. The estimated cost of moving and re-erecting the Magnet is \$50,000. This work is approximately 35% complete.

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b. The construction of five prefabricated warehouse units within the present 184th Area adjacent to the chemistry and synchrotron buildings at an estimated cost of \$11,000, including the value of the units. Two of the warehouses have been completed.

c. The alteration of gate house facilities to permit the movement of offices and telephone switchboard out of the 184th cyclotron building at an estimated cost of \$2,000. This work is essentially complete.

d. The installation of two two-story buildings, obtained from the Navy Department, and their alteration to office buildings at an estimated cost of \$60,000. In addition, the construction of access roads and a parking lot to service these buildings at an estimated cost of \$6,000.

e. The construction of the synchrotron proper, at a cost of \$500,000.

Upon completion of the construction program now authorized by Construction Directives, Government construction at this location can be summarized as follows:

| | |
|---|--------------------|
| Construction 1 May 1943 to 1 June 1946 | \$380,000 |
| Construction authorized 1 June 1946 - 1 November 1946: | |
| Synchrotron and Synchrotron Building | 561,000 |
| Office Buildings, Roads, and Parking Lot | 66,000 |
| Accessory Facilities | <u>33,000</u> |
| Total | \$1,040,000 |

The primary construction planned for the near future is that of a linear accelerator, along with the necessary building and facilities, long range planning include a medical building, carbon chemistry laboratory, general laboratory, additional shops and warehouses, a power sub-station, and possibly a larger synchrotron.

At the present time, an annex to the existing chemistry building is being constructed with University funds. This annex will be equipped from District funds at an estimated cost of \$40,000.

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