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PROGRESS REPORT FOR MONTH OF NOVEMBER 1944

CONTRACT # W-7405-eng-48-A

J. G. Hamilton

CLASSIFICATION CANCELLED

DATE AUG 21 1962

For the Atomic Energy Commission

TED REDMON

for the

Chief, Declassification Branch

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RG 326 ARGONNE NAT'L LAB
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FOLDER NOVEMBER 1944

December 1, 1944

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SUMMARY

PART I

The radio-autographic and tracer smoke studies with U_3O_8 smoke containing fission products are being continued. An assay of carefully cleaned algae from the settling basin at the site revealed that no striking selective localization of any specific member of the fission products took place. Further studies of the recently reported observations of the high degree of deposition of Sr, Y, Zr+Cb, and Ce indicates that this effect is real and not simply due to adhesion of clay particles to root surfaces. Studies concerning the fixation of fission products on various types of soils with particular reference to those existing in the Hanford area are now in progress.

The main oscillator of the 60" cyclotron has been put into operation and found to perform in a highly satisfactory manner. The lowest frequency setting for the 60" cyclotron has been measured and found to be 11.6 megacycles. This value is such that under proper resonance conditions a beam of 23.5 mev deuterons and 47 mev alpha particles will be produced by the instrument. The highest frequency available is approximately 15 megacycles. Both the power requirements for the oscillator and the magnetic field intensities needed for resonance conditions are too great for this frequency of 15 megacycles if either deuterons or alpha particles were to be accelerated. However, it does make possible the production of 20 mev protons should a need for this type of bombardment arise in the near future.

The estimated expense for November 1944 is $5,850.00 as compared to $6,700.00 for October. The personnel remained at 19.

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PART II

I. TECHNICAL PROGRESS REPORT ON METABOLIC STUDIES OF FISSION PRODUCTS

1. Radio-Autographic Studies

The preparation of radio-autographs from lungs of animals exposed to inhalation of U_3O_8 smokes containing fission products are being continued. It is anticipated within the next several weeks we will have available radio-autographs from the lungs of animals 64 days after exposure to the radioactive smoke.

2. Soil Studies

The assay of the algae from X-10 was completed. The activity was about 5.8 c per gram dry weight. For an equivalent filter thickness of 8 mgm/cm^2, the radioactive composition was as follows: Cs, 2.44%; Ba+Sr, 3.88%; Y, 3.03%; Ce, 30.2%; Zr+Cb, 50.7% Ru+Te, 9.74%. Results of the assays of the algae strongly suggest that the active material was fixed on the surfaces of the cells rather than incorporated into the living tissue of the plant.

Additional studies were made on the uptake of activity from clay suspensions by barley plants. An assay of the leaves of these plants grown in Y and Ce solutions showed the activity to be due to element in question and not due to impurities. A study of the uptake of Y by barley plants as a function of the clay content of the culture medium was carried out. An inverse relationship was established between the clay content and the activity on the roots. Experiments showed that the activity on the roots was not due to the adhesion of clay particles to the root surfaces.

Plants were grown in active culture solutions in the absence of clay. For each element (Y, Ce, Zr+Cb, Sr) the total activity on the plant was comparable with those grown in clay suspensions. However, for Y, Ce, Zr+Cb, less of the element was accumulated in the tops. The behavior of Sr. was relatively unaffected.

Radio-autographs have been set up to determine the nature of the fixation process in the roots, i.e. absorption or adsorption.

Clay fractions from a variety of soil types have been isolated. Fixation studies on these fractions will be started shortly.

3. Tracer Smoke Studies

The long term experiments, namely 64 day and 128 day intervals after exposure, are not as yet available but will be presented shortly after sacrifice of these groups. A much larger exposure chamber has been completed by Mr. Scott and will be put into operation within the next few days. This development makes it possible to expose thirty rats at one time to various types of smokes and dusts. Its initial use will be for the exposure of rats to fission product smokes produced by the volatilization of these substances in the form of their chlorides and free from uranium.

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4. Projected Studies for the Next Two Months.

The soil, plant, smoke and radio-autographic studies will be continued.

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II. REPORT ON 60" BERKELEY CYCLOTRON ACTIVITIES FOR NOVEMBER 1944

During the first two weeks of November all of the many components of the 60" cyclotron were tested. This test phase was primarily devoted to the various electrical circuits and to the determination of the resonance frequency of the dees, and electrical characteristics of both the transmission lines and the two new oscillator tubes. In addition considerable time was spent in making the final adjustments in both oscillator tubes to prevent the occurance of grid-filament shorts. It might be pointed out that with the design of the oscillator tubes, which is made necessary by the requirements of power and frequency, the physical distances between the three electrodes is such that very careful adjustments are necessary to avoid internal shorts within the tube itself. Such difficulties are to be expected and have now been satisfactorily surmounted.

The new deflector power supply has been installed and tested. It has performed satisfactorily in as much as it delivered the stated output of 140kv without any evidence as yet of either electrical or physical failure.

A series of careful measurements were made to determine the resonance frequency of the dees which was found to be 11.6 megacycles when the grounding spiders are set at the lowest position. This value is somewhat higher than we had originally anticipated and is distinctly advantageous in as much as it will now be possible for us to achieve a maximum frequency of approximately 15 megacycles. This factor is of considerable importance in as much as it is presumably possible for us to produce protons at an energy of approximately 20,000,000 volts. The lowest frequency setting, namely 11.6 megacycles, will permit us to produce 23.5 mev deuterons and 47 mev alpha particles. It is doubtful if large beam currents of either deuterons or alpha particles above 30 and 60 mev respectively can be produced in this instrument due to the large relativistic effect which most certainly will be somewhat troublesome even at 23 mev and, of course, rapidly becomes much more serious at higher energies.

During the last two weeks of November our efforts have been devoted to getting the large oscillator to operate satisfactorily and to tune it for maximum efficiency. The voltage on the dees was first achieved November 17 and by November 30 the correct setting for the spiders, which of course determine the frequency for each of the two dees, and the transmission lines, have been made. In addition the various pickup meters, which give the values of the radio frequency voltages in both the oscillator tube and the dees, have been calibrated.

It is felt that the expenditure of this two weeks of time in tuning the oscillator and making very adequate calibrations of all of the ancillary equipment would in the long run avoid much trouble.

We plan in the next few days to begin to bake in the vacuum chamber of the cyclotron which presumably will occupy about a weeks time. This, of course, is necessary due to the fact that all of the metal surfaces, which total an area of many hundred square feet, must be thoroughly outgassed before it is possible for us to begin to hunt for a beam.

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December 6, 1944

PART III

MR. H. A. FIDLER

Re: W-7405-eng-48
Report on NDP-48A

Expenditures of this project in November, 1944 are estimated as follows:

Payroll	$ 3,400.00
Overhead	850.00
Expense and Equipment	1,600.00
Total	$ 5,850.00

A budget estimate for December, 1944 and January, 1945 follows:

Payroll	$ 8,000.00
Overhead	2,000.00
Expense and Equipment	5,000.00
Total	15,000.00

Personnel at November 30, 1944 included:

Biochemist, P-5	1
" P-6	1
Biologist, P-1	1
" P-3	1
Chemist, P-3	1
" P-4	1
Clerk	1
Physiologist, P-3	2
Secretary	1
Technician, Lab.	4
" , Jr. Lab.	5
Total	19

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ESTIMATED STATUS OF NDP-48A
ON NOVEMBER 30, 1944

Payroll:

Appropriation		$99,000.00	
Payroll to October 31	$62,700.00		
November payroll	3,400.00		
		66,100.00	
Balance			$32,900.00

Overhead:

Appropriation		24,750.00	
Overhead to October 31	15,675.00		
November overhead	850.00		
		16,525.00	
Balance			8,225.00

Expense and Equipment:

Appropriation		76,450.00	
Expense to October 31	43,900.00		
November expense	1,600.00		
		45,500.00	
Balance			30,950.00
TOTAL BALANCE			$ 72,075.00

Total Appropriation	$200,200.00
Total Expense	128,125.00
Total Balance	$ 72,075.00

Kenneth Priestley
Business Manager
Radiation Laboratory

KP:ml
cc: Dr. J. G. Hamilton (2)

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12-1-44

U. of Chi. Progress Report
Feb. 1944 Part II

NBN-407207

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