Mound Laboratory, Miamisburg, Ohio

April 1, 1955

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St. Louis, Missouri

Status Report for Mound Laboratory Operations

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The following represents the operating budget as submitted in the Mid-Year Review:

Budget No.		FY 1955	FY 1956
26 XX	Production Process Development (Thorium)	$ 471,000	$ --
2911	Tritium-General (Thermal Column Work)	112,000	--
2 XXX	Thorium Sludge Processing	--	1,188,000
	Total Program 2000	583,000	1,188,000
3217	Initiators - Gross	1,250,000	954,000
	Interdepartment Transfers	(306,000)	(200,000)
	Net Cost	944,000	754,000
3900.1	Alpha Neutron Sources	169,000	146,000
	Polonium Transfers In	201,000	200,000
	Gross Cost	370,000	346,000
	Sales	(370,000)	(346,000)
	Net Cost	0	0
3641	General Weapons Development	252,000	--
	Polonium Transfers In	30,000	--
	Total - General Research	282,000	--
	Total Program 3000 Gross	1,671,000	1,100,000
	Total Program 3000 Net	1,228,000	754,000
4109	HRE	100,000	100,000
4401	ANP	300,000	300,000
	Total Program 4000	400,000	400,000
6530	Biological Research	470,000	--
	Total - All Programs - Gross	3,124,000	2,688,000
	Total - All Programs - Net	2,379,000	2,342,000

When the Mid-Year Review was prepared, it reflected the adoption of the so-called Plan III which had been submitted to the Commission about November, 1954. This plan conceived Mound Laboratory as essentially a production unit for making thorium tetranitrate, polonium initiators and neutron source products, with a small research program continuing the HRE and ANP work. It eliminated many of the service functions that have been a part of the organization.

When Plan III was proposed and the Mid-Year budget formulated, we were to reduce our personnel from 409 as of January 1, 1955 to 212 as of July 1, 1955. This plan has been modified for several reasons and as it presently stands we contemplate reaching a level of 270 persons as of July 1, 1955, gradually tapering off to 250 people by about the end of this calendar year.

We have no budget information beyond fiscal year 1956. Budget assumptions should be received in two to three weeks and should show something of Commission plans for fiscal year 1957.

OPERATIONS

The total Operations Division now comprises 85 people. The processing areas have been consolidated to accommodate the present level of polonium initiator and neutron source production and have now reached the personnel level planned for the remainder of this and the next fiscal year.

The safety department has been incorporated in the health physics area of the Operations Division and this area will now function more as an industrial hygiene group.

As the thorium refinery approaches completion, a new section will be added to Operations to staff the refinery. This group will be drawn from those engaged in the current development work and from CIO union personnel. When this is done, the division will increase to a contemplated strength of about 92 people.

DEVELOPMENT

The Development Group is now primarily engaged in developing the thorium refinery process. Their areas of effort can be listed as follows:

1. The development of fast accurate analytical methods for process control,

2. The development of data on the optimum conditions for the preparation of feed solutions for the solvent extraction system,

3. Development of a satisfactory solvent extraction process to extract and purify the thorium, and

4. The development of methods of waste handling and treatment for the thorium process.

This group of 24 people will carry the total load in this area until the operating group is formed. It will then be reduced in size to about eight people with the remaining personnel being absorbed in Operations. It will then continue to do development work on the thorium process on a smaller scale. We expect to have a two-inch glass column pilot plant in operation very soon to serve as a development unit and also as an adjunct to process operations.

In addition this group is handling the Livermore Project which consists of pressing blocks of lithium deuteride and canning them in thin aluminum cans. This job has two parts: one, the pressing and canning of normal lithium deuteride; and, two, the pressing and canning of enriched 95 percent lithium-6 deuteride. These two parts are equal in size, and we are currently working on the normal lithium. Livermore is working with the Division of Military Application to get the enriched lithium released. If they are successful, then the pressing of the enriched lithium will follow immediately upon the completion of the present work sometime in May. Even if they can obtain the enriched lithium for us by that time, the job may run into August before completion and we will have to hold some extra personnel for it. These people are primarily of a laboratory technician caliber.

We are also working on a proposal for the development and pilot plant production of thorium chloride. The size of the pilot plant would be 250 pounds per day capacity or less - the quantity needed not being definitely known at this time. The development group is working with the Engineering Division to select a process and make an estimate for this job.

We are obtaining some information from Mallinckrodt Chemical Company concerning the production of ionium. Los Alamos is interested in obtaining this material for tracer work in bomb tests and they are talking of production at about 500 grams a month. At the present time, Mallinckrodt is doing the whole job, obtaining the ionium from sludges, which are by-products of their uranium production, stored in St. Louis close to the airport site. The tentative plan is that Mallinckrodt may do part of the process operations, which will reduce the original bulk to a small quantity. Their product would be a slurry, which then would be shipped to Mound Laboratory for the remaining process operations. This process would require a special hood line. Dr. Roberson is now checking with Oak Ridge to see how firm their plans are for Mound to enter into this picture. It would be a small job involving perhaps two to three operating personnel, plus some analytical work which could possibly be absorbed by our present staff.

RESEARCH

As a left-over from the hydriside program, we are finishing a study on the separation of hydrogen isotopes by thermal diffusion. The original aim of this work was to evaluate this method against electrolysis and low temperatu distillation for the separation and recovery of hydrogen isotopes. When the original need ended, the emphasis on this work was shifted to evaluating the theoretical calculations on thermal diffusion columns against experimental data. The Production Division of the Atomic Energy Commission has stated they will not sponsor this work beyond the end of this fiscal year. However, since the installation represents a capital investment of about $60,000 and there is still much to be learned from the equipment, it is proposed to submit a request for funds to the Research Division of the Atomic Energy Commission. Conferences with Dr. G. A. Kolstad, Dr. H. Roth and Dr. D. Cope of the Research Division have indicated that they would be interested in evaluating such a request. There is also interest in the application of thermal diffusion to the separation of isotopes of rare gases. Unless we can interest the Research Division in sponsoring a small continuing effort, this work will be closed out as of June 30, 1955.

General Weapons Development

There are a few details of the polonium and actinium projects which are being finished as time permits. The work, which consists mainly of finishing half life measurements of isotopes of polonium, radium 226 and daughters, actinium 227 and daughters and thorium 228 and daughters, should be finished this fiscal year.

During the first seven months of this fiscal year, cold and hot runs were made with the production concentration still and the experimental continuous still to determine their efficiency in separating polonium from irradiated bismuth. This work was done jointly with the Engineering Division and has now been concluded. Appropriate reports will be written and the still installation will be left in standby condition until further interest develops in this area. The Operations Division does not contemplate using the still for regular production work at this time.

Intermediate Scale Homogeneous Reactor

Oak Ridge National Laboratory has assigned to us the problem of obtaining one gram of protactinium 231 in connection with the development work of the Intermediate Scale Homogeneous Reactor. In addition, the Research Division of the AEC has asked us to obtain a second gram of this material. The preliminary study was made to decide whether the material should be extracted from uranium ores or should be made artificially in a nuclear reactor by the irradiation of thorium 230. It was decided to extract the material from uranium ores. The most suitable source was a precipitate in the raffinate from the Mallinckrodt process for obtaining uranium. It will be necessary to process about fifteen tons of this material to obtain the two grams of protactinium. A process has been developed on a laboratory scale of five kilogram batches, and the Engineering Division is working on the design of a process to handle batches of 250 kilograms per day. Equipment is being obtained and it is expected that process operations will be started before the end of this fiscal year. When protactinium becomes available in milligram to gram quantities, we are to participate in the study of the chemistry of this element. This work will continue through fiscal 1956.

Fluid Cycle Aircraft Reactor

Oak Ridge National Laboratory has given Mound Laboratory the responsibility for obtaining certain information necessary for their program on the Fluid Cycle Aircraft Reactor. On the basis of the literature available on the sodium fluoride, beryllium fluoride and uranium tetra-fluoride binary phase diagrams, it has been decided that the ternary phase diagram of this system should be obtained. Accordingly we have undertaken the problems of obtaining the phase rule diagrams, densities and viscosities of the ternary system.

which will mean that engineering personnel will be required until at least January 1, 1956 for the completion of reports. At the present time the division has 96 people, the bulk of these being in maintenance. There will be a small number of layoffs as of June 30 and a gradual transfer of some union personnel into the Operations Division as chemical operators for the thorium refinery. By the end of the year, there will be about 70 people in the division. As time progresses these people will undoubtedly feel more insecure about their jobs. Unless some additional work comes into the laboratory or they can be assured of future work elsewhere with the company, it may be difficult to retain the engineering personnel necessary to complete the thorium refinery. Needless to say, keeping qualified engineering personnel as long as possible will enhance our chances of securing additional projects.

BUSINESS

The Business Division will be considerably reduced in size to bring it in line with the proposed organization. In addition to its present functions, it will take over work of the former Personnel Relations Division, which has already been absorbed, and that of the Security Division. The Security Division should be absorbed by June 30.

SECURITY

This division will be eliminated as of June 30, and a force consisting of one captain and eleven troopers will be left. This group will be under the direction of the Personnel Manager in the Business Division. Necessary physical changes consisting primarily of some new fencing will be required to make the new security plan operative.

BIOLOGY

This division will be eliminated as of June 30 and all work will be closed out by then.

Personnel

	Actual 4/1/55	Contemplated 12/31/55
Administration	3	3
Operations	65	92
Development	24	8
Research	41	27
Engineering	100	72
Business	66	43
Accounting	7	7
Security	50	-
Biology	16	-
	372	252

Approximately 75 technical personnel will be in the December 31, 1955 organization.

E. C. McCarthy
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