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BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.

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THE FOUNDING OF THE BROOKHAVEN NATIONAL LABORATORY
BY ASSOCIATED UNIVERSITIES, INC.

Final Report of work by Columbia University
under Contracts W-7405-eng-50, W-31-109-eng-15
and AT-30-1-GEN-71

UPTON, NEW YORK
January 15, 1948

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ABSTRACT

The Brookhaven National Laboratory, at Upton, Long Island, is operated under a contract with the Atomic Energy Commission by a non-profit corporation, called Associated Universities, Inc., incorporated under the Education Laws of the State of New York. This corporation consists of representatives of the following nine northeastern universities: Cornell University, Columbia University, Harvard University, The Johns Hopkins University, Massachusetts Institute of Technology, University of Pennsylvania, Princeton University, University of Rochester, and Yale University.

During the preliminary period of planning, before funds were available for the Laboratory on a Letter Contract, the expenses incurred by the Initiatory University Group of these universities and later by the corporation were defrayed through contracts held by Columbia University with the War Department and later with the Atomic Energy Commission. This report is the final report on these contracts, W-7405-eng-50, W-31-109-eng-15, and AT-30-1-GEN-71. It covers the work of founding the Laboratory through January 31, 1947.

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1. INTRODUCTION

At the end of the war it became apparent that the teamwork of government and scientific institutions, which had been so effective in wartime work, must somehow be perpetuated in order to insure the continued progress of nuclear science in peace time. The enormous expense of the tools needed to pursue the next steps in this research -- nuclear reactors and high energy accelerators -- and the shortage of scientifically trained personnel pointed towards the establishment of a cooperative laboratory. Such a laboratory, using government funds, could carry out a comprehensive research program that would benefit the many interested research groups throughout the country. As a result of the wartime programs under the Manhattan District, centers of research in nuclear science were already active at the Radiation Laboratory in Berkeley, California, at Los Alamos in New Mexico, at the Clinton Laboratories in Oak Ridge, Tennessee, and at the Argonne Laboratory in Chicago. No analogous nuclear research laboratories, however, had developed in the Northeast, and since so much of the nation's scientific talent and industrial activities are concentrated in the northeastern states, it was proposed that a new laboratory be established near New York City.

As a result of this plan, the Brookhaven National Laboratory is now in operation at Upton, Long Island. The work of this Laboratory is performed under a contract between the Atomic Energy Commission (AEC) and a corporation, Associated Universities, Inc. (AUI), formed by representatives of nine of the larger private universities in the northeast: Columbia, Cornell, Harvard, Johns Hopkins, the Massachusetts Institute of Technology, the University of Pennsylvania, Princeton, the University of Rochester, and Yale. The purpose of this laboratory is the advancement of knowledge in the fundamentals of nuclear science, the extension of its application to other fields, and the training of young scientists in these new subjects.

This report, the final report of the Columbia University contracts which financed the first year of development of the Brookhaven National Laboratory, summarizes the successive stages of organization, the considerations underlying some of its basic policies, and the methods of attack on the general problems encountered in founding the Laboratory.

During the preliminary period of planning covered by this report, from early January 1946 until January 31, 1947, Columbia paid for salaries, office space, travel and consultant fees, and other expenses incurred by the new organization. These funds were provided through contracts held by the university with the War Department and later with the AEC. A supplement, dated April 3, to a contract with the War Department, W-7405-eng-50, covered the work to June 30, 1946. Contract W-31-109-eng-15, with the War Department, covered the work to December 31, 1946. On January 1, 1947, this contract was converted to a contract with the AEC, AT-30-1-GEN-71, which lasted until January 31, 1947. After this date a Letter Contract, AT-30-2-GEN-16, dated January 7, 1947, between AUI and the AEC, permitted AUI to assume all expenses.

GEOGRAPHICAL DISTRIBUTION BY STATES OF UNIVERSITIES, COLLEGES AND TECHNICAL SCHOOLS
IN THE NORTHEASTERN SECTION OF THE UNITED STATES
APPROVED BY THE ASSOCIATION OF AMERICAN UNIVERSITIES

FIGURE 1

There was, of course, no sole originator of the idea of a laboratory in this area. The recognition of the necessity of some sort of cooperative laboratory in order to make available the special tools needed in nuclear research had led many groups of scientists, during the months after the war, to speculate about possible solutions to this problem. Dean George B. Pegram, of Columbia, called a meeting on January 16, 1946, which was attended by representatives from leading research institutions in the New York area. At this meeting a letter was drafted to Major General Leslie R. Groves, Commanding General of the Manhattan District, stating the need for such a laboratory, and offering the assistance of these institutions in taking the steps necessary to achieve it. Discussions between representatives of the War Department and of research institutions in the whole northeastern region led to the formation of an Initiatory University Group (IUG) to act as direct sponsors in the founding of the proposed laboratory. This group was composed of representatives from the nine universities listed above, acting as agents for all of the research groups in the region. After months of study as to the most practical means of establishing such a laboratory, it was decided to incorporate under the name of Associated Universities, Inc. with two trustees appointed to represent each of the nine universities. They undertook the task of drawing up a contract with the Manhattan District of the War Department for the operation of the laboratory. These contract negotiations were later taken over by the AEC when it assumed all of the responsibilities formerly carried by the War Department in the field of nuclear energy.

Dr. Philip M. Morse, of the Physics Department of M.I.T., who during the war was Director of the Operations Research Group of the U. S. Navy, was appointed Director of the Laboratory. The Army's Camp Upton, in Brookhaven Township, Suffolk County, Long Island, was chosen as the laboratory site. The original working staff of the IUG was transferred to be the nucleus of the staff of the Brookhaven National Laboratory, and additional scientists and administrative personnel were hired. In January 1947 the staff moved from the offices at Columbia to Camp Upton, leaving only a small office force at Columbia. On January 31, 1947 the work under the contract with Columbia was discontinued.

A number of the problems that received special attention during this planning period are reported here in some detail. For the teamwork between the government and the institutions participating in the scientific program to be truly effective, this laboratory required innovations in its organizational structure. The selection of an appropriate site required careful study. The scientific program of such a laboratory must at once supplement the scientific research at other institutions in this region and yet avoid any unnecessary duplication. The relation of the Laboratory to the universities, in serving as an extension of graduate school facilities, was a situation without obvious precedent. The succession of discussions required to arrive at a definite, liberal contract between the AUI and the government illuminated many problems. The Laboratory organization must be sufficiently businesslike to handle the vast government funds, and yet retain an atmosphere of academic freedom approximating that of a university laboratory. These topics are discussed in the succeeding sections of this report, with frequent reference to the letters and minutes which record the successive stages in the development of the laboratory.

THE ASSOCIATED UNIVERSITIES
AND
BROOKHAVEN

FIGURE 2

2. PRELIMINARY ORGANIZATION, PRIOR TO INCORPORATION OF AUI

It was clear that the scientific program for a research center in this area would have to originate in the institutions it was to serve. The problem of how this could best be accomplished, however, required considerable study. Dean Pegram*, in calling the initial meeting for January 16, 1946, approached research organizations in the metropolitan region from Philadelphia to New Haven. The area which such a laboratory might properly serve was soon extended to the entire northeast region, and institutions from Baltimore to Cambridge and west to Rochester were included in the plans. Figure 1 indicates the concentration of research workers in this region. In order to facilitate negotiations with the government, it seemed desirable for nine of the major private universities in this area to provide the direct sponsorship of the proposal, with the approval and support of the other institutions. This number was selected for convenience in administration, while participation in the research program is, of course, open to all qualified institutions.

At the first meeting, on January 16, it was voted unanimously that the groups represented were interested in sponsoring the establishment of such a laboratory. A committee, consisting of Dr. R. Bown of Bell Telephone Laboratories, Dean H. J. Masson of N.Y.U., Dean Pegram, Dean H. S. Taylor of Princeton and Dr. W. W. Watson of Yale, were instructed to write a letter transmitting this proposal to General Groves. In this letter the reasons summarized in Section 1 were presented, and the sponsoring institutions offered to confer further with the War Department as to the best way to set up such a laboratory. This letter (D6)**, sent to General Groves on January 19, was signed by Dean Pegram on behalf of the institutions listed below:

- Bartol Research Laboratory, Swarthmore, Pa.
- Bell Telephone Laboratories, N.Y.C.
- Brooklyn College, N.Y.C.
- Carnegie Inst. of Washington, Dep't. of Genetics, Cold Spring Harbor, N.Y.
- College of the City of New York, N.Y.C.
- Columbia University, N.Y.C.
- Cornell University Medical College, N.Y.C.
- Fordham University, N.Y.C.
- Long Island College of Medicine, N.Y.C.
- Memorial Hospital, N.Y.C.
- New York University, N.Y.C.
- Princeton University, Princeton, N.J.
- Polytechnic Institute of Brooklyn, N.Y.C.
- Queens College, N.Y.C.
- Research Corporation, N.Y.C.
- Rockefeller Institute of Medical Research, N.Y.C.
- Rutgers University, New Brunswick, N.J.
- Standard Oil Development Corporation, N.J.
- Stevens Institute of Technology, Hoboken, N.J.
- University of Pennsylvania, Philadelphia, Pa.
- Yale University, New Haven, Conn.

* the full names of persons mentioned in this report are given in Appendix C.

** reference numbers in parentheses refer to documents listed in Appendix D.

General Groves' reply, dated January 22, arranged for a conference on February 8th between Colonel K. D. Nichols (later Brigadier General) of the Manhattan District, and, as representatives of the sponsoring institutions, Dr. H. D. Smyth and Dean H. S. Taylor of Princeton and Dr. I. I. Rabi and Dean Pegram of Columbia. At this meeting it was apparent that the Manhattan District was interested and willing to hear more specific proposals.

In a second letter to General Groves, dated March 3 (D9), the nine private universities shown in Figure 2 offered themselves as direct sponsors for the laboratory, pointing out that

"the universities of the area are experienced in the handling of large undertakings. They sponsored some of the most extensive projects of the Office of Scientific Research and Development, and understand the problems of organization and personnel, of financial responsibility, of large scale research and development, of security, of relationships to government bodies and the armed services, which would be concerned in a large laboratory of nuclear science and engineering. Many of the scientists and engineers of the area held positions of wide executive and administrative responsibility in the various war laboratories."

At this time it was proposed that the Laboratory

"should be operated by a single institution as the contractor, preferably a single university, but that the scientific direction should be in the hands of a board representing the sponsoring institutions and appropriate government agencies." (D9)

As the informal discussions with the Manhattan District proceeded, it became apparent that an arrangement that involved participation by several institutions would be more effective. Dean Pegram, in a letter addressed to the presidents of the universities, stated that it was now

"desirable to move promptly towards effecting more formal arrangements among the (nine) universities to organize a group, a committee, or committees, to take the responsibility of carrying forward with the Manhattan District the necessary plans and work preliminary to the establishment of the laboratory." (D11)

The presidents of the nine universities were requested to designate representatives, to attend a meeting, "preferably at least one scientist and one administrative officer who could represent authoritatively the general policies of each institution."

On March 23, the following men representing the nine universities were asked to assemble at Columbia:

Dr. R.F.Bacher.....	Cornell
Mr. G.A.Brakeley.....	Princeton
President E.E.Day.....	Cornell
Dr. L.A.DuBridge.....	Rochester
Dr. J.R.Dunning.....	Columbia
Dr. R.D.Fowler.....	Johns Hopkins

Dr. G.B.Harnwell.....Pennsylvania
 Dr. G.Kistiakowsky.....Harvard (unable to attend)
 Dr. P.S.Macaulay.....Johns Hopkins
 Dean G.B.Pegram.....Columbia
 Dr. E.C.Pollard.....Yale
 Dr. I.I.Rabi.....Columbia
 Dr. N.F.Ramsey.....Columbia
 Dr. J.C.Slater.....M. I. T.
 Dr. H.D.Smyth.....Princeton
 Dr. W.W.Watson.....Yale
 Dr. J.R.Zacharias.....M. I. T.

Dr. DuBridge was elected chairman of the meeting and Dr. Ramsey, secretary. After preliminary discussion, the following resolution was unanimously passed:

"RESOLVED: That Columbia University, Cornell University, Harvard University, The Johns Hopkins University, Massachusetts Institute of Technology, University of Pennsylvania, Princeton University, University of Rochester, and Yale University, being interested in promoting the establishing in the northeast region of the country (of) a government research laboratory for nuclear science and in cooperating with other institutions of this region in the operation of such a laboratory, do now join for the furtherance of these interests in an association through representatives duly authorized by the heads of these universities, to be known as the Initiatory University Group." (D12)

The Initiatory University Group (IUG), so constituted, proceeded further to establish its rules of procedure and appointed a Planning Committee, consisting of a scientific representative from each university to discuss scientific plans with the Manhattan District. Major policies were to be determined by the IUG as a whole.

In order to pay for secretarial help and the salaries of administrative personnel during this initial period of planning for the laboratory, an interim arrangement was made whereby Columbia University charged these expenditures to an existing contract with the Manhattan District. A preliminary budget for expenses was prepared, providing for salaries, administrative expenses such as office space and furnishings, travel for committee members, and preliminary contracts. Mrs. J. B. H. Kuper started work in March as the first employee of this planning group. Dr. Clarke Williams agreed to spend half of his time on this program, since he was already employed under this Manhattan District contract. Dean Pegram and Dr. Ramsey, at the request of Dr. DuBridge, continued their efforts with no compensation, devoting all the time they could spare from their regular duties.

The first meeting of the Planning Committee of IUG was held on March 30, 1946 (D16). Dr. DuBridge acted as chairman, and the committee members, who had been formally designated as scientific representatives to IUG were as follows:

Columbia - I.I.Rabi, N.F.Ramsey	M. I. T. - J.R.Zacharias
Cornell - R.F.Bacher	Pennsylvania - L.N.Ridenour
Harvard - J.H.Van Vleck	Princeton - H.D.Smyth
(for G.B.Kistiakowsky)	Rochester - L.A.DuBridge
Johns Hopkins - R.D.Fowler	Yale - W.W.Watson

The business of this meeting was to make detailed plans for the next stages in setting up the laboratory. Sub-committees were appointed to study specific problems. Chairmen of these committees, listed below, were members of the Planning Committee, while additional members were drawn from outside to provide appropriate special experience.*

Sub-committee on Contract, H. D. Smyth, chairman. The initial activities of this committee are covered in this section, with the main part of the contract negotiations treated in Section 6, under the work of AUI.

Sub-committee on Site, N. F. Ramsey, chairman. The work of this committee, leading to the selection of Camp Upton for the laboratory site, is reported in Section 3.

Sub-committee on Reactors, R. F. Bacher, chairman. The work of this committee, leading to the decision to construct an air-cooled nuclear reactor not very different from the existing experimental pile at Oak Ridge, is covered in general terms in Section 4, part b.

Sub-committee on Electronuclear Machines, J. R. Zacharias, chairman. This committee studied the question of what types of machines should most appropriately be constructed at the national laboratory, in order to fit in with and supplement the programs under way at the surrounding universities. This work is also covered in Section 4, part c.

Sub-committee on Personnel Policy, I. I. Rabi, chairman. The work of this committee is covered in Section 5.

Sub-committee on Security and Classification, W. W. Watson, chairman. This committee formulated the general policies of IUG in regard to undertaking classified research, clearance requirements for employees, and similar matters, to be ultimately expressed in the AUI contract with the AEC.

Dr. Smyth, as chairman of the Sub-committee on Contract, recommended that this group be composed of representatives from the administrative departments of the universities. Accordingly, the following men met as the Sub-committee on Contract: G. A. Brakeley (Princeton), J. R. Killian (M.I.T.), P. S. Macaulay (Johns Hopkins), and G. B. Pegram (Columbia). In the instructions given to the Sub-committee by the Planning Committee, the members were asked to consider the relative merits of three possible mechanisms for contracting for the operation of the laboratory: (1) a single university, (2) an industrial as opposed to a non-profit organization, (3) a new corporation formed by the universities as a contractor.

The first meeting of this Sub-committee was held April 8, 1946. (D20) It was now agreed unanimously that some form of inter-university corporation was preferable to operation by a single institution. Dean Pegram had already examined in some detail the methods of establishing such an organization of universities, and had explored with Dr. J. H. Miller, Deputy Commissioner of Education in New York State, the possible ways in which such a corporation might

*See Appendix B for list of committees.

be formed. After extensive discussion of these findings, the Sub-committee, in its report to the Planning Committee on April 16, 1946,

"recommended the formation of a corporation under the Education Law with the supervision of the Board of Regents in New York State, and/or under a similar law in another state. They proposed that each university should underwrite the project to the extent of \$100,000." (D27)

Proposed by-laws were submitted, providing for a board of trustees, nine in number, that should oversee the operation of the laboratory, a Scientific Panel with general responsibility for the policies and the undertakings, a Director, to be responsible to the Scientific Panel and to administer all the scientific and technical operations of the Laboratory and all personnel relations, and "an appropriate and adequate business organization for handling the finances of the laboratory." In the discussion of these recommendations, it was emphasized that membership in the Scientific Panel shall not be restricted to the underwriting universities. The amount of the participation fund was questioned. Finally Dean Pegram was appointed chairman of a new Committee on Incorporation which should first study the legal aspects of incorporation and then submit articles for incorporation in New York, New Jersey and Connecticut.

In carrying out these instructions Dean Pegram first engaged Mr. J. J. McCloy of the firm of Milbank, Tweed, Hope, Hadley and McCloy as legal counsel. After preliminary study it was recommended, in a report to the Planning Committee on May 18, 1946 (D33), that the State of incorporation be the same as that in which the laboratory is located, that the committee agree on the participation fund amount, and that before proceeding further with adopting articles of incorporation, it be determined, in consultation with representatives of the Manhattan District, that the powers and responsibilities proposed for the corporation be adequate from the government's standpoint. Accordingly, it was arranged that each of the nine university presidents should be asked to designate a member to the Committee on Incorporation. The Committee on Contract was re-formed at the meeting, under the chairmanship of Mr. Joseph Campbell, Assistant Treasurer of Columbia, with N. M. Sage (M.I.T.), R. J. Woodrow (Princeton), and F. W. Loomis (U. of Illinois) as members. It was proposed that a representative of the Manhattan District draw up a draft of a contract for criticism by this committee. Three drafts had been proposed and discussed by the time AUI was incorporated in July. This work and the further activities of this committee are discussed in Section 6.

One additional change in the organization took place at this May 18 meeting of the Planning Committee. Dr. DuBridge suggested that, in view of his departure from Rochester to become president of the California Institute of Technology, a new chairman be elected. Dr. Bacher was nominated and unanimously elected chairman of the Planning Committee, and it was agreed that Dr. Rabi should nominate Bacher as chairman of the IUG at its next meeting, on June 1, 1946. Dr. Bacher was then elected chairman of the IUG.

The Committee on Incorporation, now consisting of G. B. Pegram (Columbia), A. S. Adams (Cornell), E. Reynolds (Harvard), P. S. Macaulay (Johns Hopkins), J. R. Killian (M.I.T.), W. H. DuBarry (Pennsylvania), G. A. Brakeley (Princeton), R. L. Thompson (Rochester), and E. W. Sinnott (Yale), conferred with legal counsel, and in a report to the IUG at a meeting on June 1 stated that a draft

for incorporation in New Jersey was nearly complete. New Jersey had been selected both because a number of probable sites were located there and certain legal provisions made this incorporation most expedient. The Planning Committee agreed that it was acceptable to incorporate with the original nine universities, more to be added later if desirable, and the committee was requested to proceed with plans for incorporation in New Jersey.

The name for the corporation has considerable history. Dean Pegram used "Universities, Inc." in drafting a possible scheme of organization in March. The legal counsel submitted a list of possibilities, including "University Institute of Research", "AUI", "Atlantic University Research", "University of Advanced Research". Dean Pegram recorded a number of experimental abbreviations, including "Univas, Inc.", "Nures Corp." (nuclear research), and "Pyjohmitch Corp.", and "Phytch Corp.", formed from the initials of the nine universities. The final decision was made at a meeting of the Committee on Incorporation on June 6, 1946, where "Associated Universities, Inc." was adopted. (D42)

The question of whether the universities themselves should be members or whether they should be represented by individuals in the corporation was another feature of the incorporation problem. It appeared, however, that actual legal obstacles would arise with two of the universities if the former arrangement were used. Therefore, since the members of the Committee on Incorporation felt that representation through individuals would be satisfactory, this arrangement was written into the charter drafted for incorporation in New Jersey. Although it was learned that the government preferred the former arrangement, it was agreed to proceed with the latter, in order to avoid further delay.

The Incorporation of Associated Universities, Inc., a New Jersey corporation, took place on July 8, 1946. G. A. Brakeley, G. B. Pegram, I. I. Rabi, H. D. Smyth, and W. W. Watson signed the charter as the incorporating trustees. The first meeting of the corporation took place on July 10, 1946 (D54), when thirteen additional trustees were elected, by-laws adopted, and procedures established. The corporation resolved at this meeting to request Camp Upton as a site for its laboratory. The slate of committees, as established for IUG (D40), was taken over to perform similar functions within AUI, with the provision that the Director of the Laboratory, when appointed, become a member of all the committees ex officio. The officers of the corporation were elected as follows:

President.....	Edward Reynolds
Secretary.....	T. I. Parkinson, Jr.
Treasurer.....	Joseph Campbell
Executive Committee.....	G. A. Brakeley
Executive Committee.....	P. S. Macaulay
Executive Committee.....	J. R. Zacharias
Executive Committee.....	R. F. Bacher

The Executive Committee of AUI, of which the AUI President is Chairman, "in the intervals between meetings of the Board of Trustees", has the "immediate charge, management, and control of the activities and affairs of the corporation." At this first meeting, the Executive Committee was specifically empowered to approve the actions of the Committee on Contract in its negotiations with the War Department and to select a Director for the Laboratory.

After the decision had been made to establish the laboratory at Camp Upton, Long Island, the Executive Committee deemed it necessary to incorporate AUI in New York State. Incorporation of Associated Universities, Inc. as a New York corporation took place with the granting of the absolute charter by the New York State Board of Regents on July 18, 1946, with G. A. Brakeley, G. B. Pegram, I. I. Rabi, H. D. Smyth, and W. W. Watson as the incorporating trustees. The first meeting of the trustees following the grant of the charter took place on July 30, and actions taken by the New Jersey corporation were formally repeated for the New York corporation. (D57)

3. SELECTION OF LABORATORY SITE

The selection of Camp Upton as the site for the national laboratory was made after more than three months of study, during which more than a dozen possibilities were investigated. A Sub-committee on Site, appointed March 30, 1946, and consisting of N. F. Ramsey, Chairman, R. F. Bacher, H. D. Smyth, and J. R. Zacharias, made preliminary inspection of most of these. E. L. Van Horn of the Manhattan District, who later became Area Manager of the Brookhaven Area for the AEC, assisted this committee in their examination of these possible sites. Some of the sites investigated later proved unavailable, and as a detailed understanding of the site requirements developed, the field narrowed to a few choices. Finally the Stone and Webster Engineering Corporation was retained by the Manhattan District to report on two sites, Fort Hancock on Sandy Hook in New Jersey, and Camp Upton in the center of Long Island. On July 10, 1946, at the first meeting of the trustees of AUI, the New Jersey corporation, it was stated that

"upon the report of its Sub-committee on Site, the Planning Committee, voting five to two, had agreed that Camp Upton was the most suitable site under all the circumstances, and voting unanimously that Camp Upton was acceptable to the Committee. The trustees accordingly resolved the approval of this location, and the initiation by the Manhattan District of the procedures required to secure the use of the camp and its facilities." (D54)

The primary requirement for a laboratory site was accessibility to all the research institutions in the northeast region. In order to serve scientists from the area bounded by Cambridge, Rochester, and Washington, it was felt that the site should be within an hour's drive from some station on the coast-wise lines of the Pennsylvania or New Haven railroads. Such a location would permit scientists, by traveling during the evening, to spend one day at the laboratory and the next back at their own universities.

The far more compelling requirement that the nuclear reactors and electro-nuclear machines be adequately removed from concentrations of population was recognized increasingly as the site problem received study. The disposal of radioactive waste materials, the needs for quantities of cooling water, the distribution of gases from the stack of an air-cooled pile, were considerations which imposed special geographical requirements. Speaking for the government, Colonel G. W. Beeler of the Manhattan District, stated explicitly that drainage of the site must not seep into sources of drinking water because of the possibility of the concentration of radioactive waste. The government also requested that the site be five to ten miles from any populous area, because of

SITES CONSIDERED FOR A NATIONAL LABORATORY

- A. BEAR LAKE - in Ramapo Mountains, near Suffern, N.Y. (43 min. from Columbia)
- B. BIG PIECE MEADOW, in bend of Passaic River, near Towaco, N.J. (46 min. from Columbia)
- C. FORT SLOCUM - on David's Island, off shore of New Rochelle, N.Y. (30 min. from Columbia)
- D. GREAT SWAMP - on Passaic River, near Chatham, N.J.
- E. LAKE ZOAR - on Housatonic, N.W. of New Haven, Conn. (30 min. from Yale)
- F. PALISADES - bordering Palisades Park, near Rockleigh, N.J. (22 min. from Columbia)
- G. ROCKY HILL - 5 miles N. of Princeton, N.J. (10 min. from Princeton)
- H. UNTERMEYER LAKE - in mountains near Boonton, N.J. (50 min. to Columbia)
- I. FORT DEVENS; near AYER, Mass. (60 min. to Harvard)
- J. CAMP SHANKS - near Tappan, N.Y. (30 min. from Columbia)
- K. CAMP UPTON - near Patchogue, N.Y. (100 min. from Columbia)
- L. FORT HANCOCK - on Sandy Hook peninsula, near Red Bank, N.J. (90 min. to Columbia)
- M. ALPINE, N.J. on Hudson, River opposite Yonkers (30 min. from Columbia)
- N. MILLSTONE RIVER - section near New Brunswick, N.J. (15 min. from Princeton)
- P. North of BEAR MOUNTAIN
- Q. CONNECTICUT shore
- R. SADDLE RIVER country

FIGURE 3

"the desirability of preventing any increase in background detectable in a populous area by individuals whose purpose may not always be well-meaning..." (D49)

The elaboration of these various requirements is perhaps best indicated from a chronological summary of the findings of the Sub-committee on Site and from the Stone and Webster Report (D50). Figure 3 indicates the location of the sites considered. In this section only those sites which were given extensive consideration are discussed in any detail.

One of the original reasons for establishing a national laboratory in the northeast was that so many of the scientists needed for consultation and cooperative work were already established nearby. Figure 1 of this report, showing the location of colleges and universities in the northeast, provides some indication of this concentration of research personnel. It was also felt that the cultural advantages of living in this region and the opportunity of studying at nearby universities should make work attractive to prospective employees. Another point was that commercial materials would be readily accessible.

The instructions to the Sub-committee on Site included the following points: that the site be "as near as possible to New York City", that it comprise at least one square mile in area, that it be adjacent to a good community or communities, that it be a promising resort for summer vacations and weekends, and that there be no direct drainage into drinking water reservoirs.

With these points in mind, the Sub-committee on Site investigated sites in 12 regions near New York. These locations are indicated on the map in Figure 3, as letters A-L. This material is found in more detail in the Sub-committee report, dated April 15, 1946 (D23). In presenting this first report to the Planning Committee, the Sub-committee had already reduced the number of promising sites to eight, rejecting the region north of Bear Mountain (P), the Connecticut shore (Q), and the Saddle River Country (R) as not sufficiently accessible. In the report the site committee mentioned most favorably the possibilities at Fort Slocum (C), a well-developed army installation on David's Island off the shore of New Rochelle; Untermeyer Lake in the mountains near Butler, N. J. (H); Bear Lake in the Ramapo Mountains of N. J. (A); Rocky Hill, (G) which is five minutes away from Princeton; the Big Piece Meadow or Great Swamp locations in the marsh lands of the Passaic River in N. J. (B, D); a piece of the Palisades near Alpine, N. Y. (M); and Lake Zoar in inland Connecticut (E). After discussion of this report, the Planning Committee prepared a letter to the Manhattan District, expressing interest in three sites, with choice in the following order: Fort Slocum (C), Untermeyer Lake (H), and Bear Lake (A). The IUG approved this letter on the following day (D28), and it was sent, despite some concern that Fort Slocum, being situated on an island of limited size, might prove too small a site for the intended installations.

The section describing Fort Slocum in the Sub-committee report indicates the status of the thinking on site requirements at this initial stage:

"David's Island or Ft. Slocum is an island approximately 3,000 feet long and 1,500 feet wide about 0.8 miles from the shore off New Rochelle.

PROPOSED LABORATORY LOCATION at FORT HANCOCK

FIGURE 4

Ft. Slocum is now army surplus property. The Army Air Forces are beginning to put a bid in for it, but if a sufficiently strong case were made, we could probably have it. The island comes complete with roads, buildings, two ferries, at least one launch, tennis courts, bathing beach, etc.

"The housing on the island could speed the establishment of the laboratory during the present housing shortage, since new personnel could live on the island while looking for permanent housing on the mainland. The greatest evil of the site appears to be its closeness to the mainland.

"The prevailing winds blow from the west and northwest toward the less densely populated portions of Long Island, four to ten miles away. New Rochelle and surrounding communities are very attractive ones for residence. The schools are good. There is already a good road system on the island. Cooling water is abundant and pure water comes from New Rochelle." (D23)

Despite this favorable report, however, the investigation of other sites continued. At the next meeting of the Planning Committee further consideration was given to three other army installations: Camp Shanks up the Hudson at Tappan, New York (J); Camp Upton (K); and Camp Devens, (I) an hour and a half ride from Boston, Massachusetts. These three sites had also been investigated by the Site Sub-committee with the first group, but had appeared less promising at that time. A visit to Oak Ridge during this period emphasized large amounts of cooling water would be required for the pile design, and this necessitated investigation of well and reservoir facilities in greater detail.

When the Stone and Webster survey was undertaken in May (D50), Fort Slocum continued in favor, but its limited size and the indication that the Air Force would need this site made alternative choices necessary. The probability that the army would retain much of the area for its own use ruled out Camp Devens. As the Federal Public Housing Administration was planning a veteran's housing project at Camp Shanks, the problem of public reaction if this were cancelled in favor of the atomic energy laboratory, in addition to other rather severe limitations of this site, eliminated Camp Shanks from consideration. Accordingly, the Manhattan District requested that Stone and Webster study two developed sites, Camp Upton and Fort Hancock on Sandy Hook (L). However, should an undeveloped site prove more economical, two thinly-populated sections of New Jersey were also under consideration, Lake Untermyer and a new site near the Millstone River (N).

Fort Hancock, which is reached either by railroad from Red Bank, N. J., or by ferry from the Battery in New York City, is illustrated in Figure 4. The Stone and Webster report states in part:

"Fort Hancock is a military reservation including all of Sandy Hook, New Jersey. It is reported that Fort Hancock will be continued in operation as an active military installation, which for practical purposes restricts the selection of a laboratory site to the central portion of Sandy Hook in order to be as far removed as possible from the main Fort installations on the north, and the concentration of

civilian population to the south.

"Since Fort Hancock will continue in operation, the only buildings available as surplus are those not now in use and these are not generally suitable for conversion to laboratory project structures.

"Existing utility installations at Fort Hancock, which will have surplus capacities available to the Sandy Hook laboratory area, consist of approximately 500,000 gallons per day filtered domestic water supply, and adequate capacity in an existing sewage disposal plant to handle the laboratory sewerage.

"In general, however, the selection of a laboratory site on Sandy Hook, separated by more than one mile from the main Fort area, and without extensive use of existing facilities, is not substantially different to selection of an undeveloped site."

The report then goes on to discuss the Camp Upton site, illustrated in Figures 5 and 6.

"Camp Upton affords a considerably different situation because the entire reservation is scheduled to become surplus and to be vacated in the immediate future, which permits unrestricted selection of the laboratory area, and use of existing buildings and facilities.

"Camp Upton is located in Suffolk County, Long Island, 12 miles east of Riverhead, approximately seven miles inland and midway between Long Island Sound to the north and the Atlantic Ocean to the south.

"Existing buildings at Camp Upton, with a limited amount of remodeling and reconditioning, would afford adequate and suitable structures for the first-year requirements of the laboratory, shop, and service facilities.

"The housing shortage at both locations is acute, but may be relieved more rapidly in the area of Sandy Hook because of the suburban character of the particular New Jersey section compared with the rural character of Suffolk County, Long Island.

"The prevailing winds, on an annual basis, are west to southwest at both locations, and the weather conditions are approximately comparable except that Sandy Hook is exposed to the direct force and effect of ocean storms.

"Additional water supplies at both locations would be developed by drilling wells, but the source of supply at Sandy Hook is far less dependable than at Camp Upton.

"Disposal of radioactive recycle cooling water would be accomplished, without retention, by off-shore outlet into the ocean at both locations, but at Camp Upton it would be necessary to construct a seven-mile pipeline to Long Island Sound.

"Evaluation of the cost of development and construction of the

APPROACHES TO BROOKHAVEN NATIONAL LABORATORY

FIGURE 5

CAMP UPTON and TARGET RANGE
 SITE PROCURED for BROOKHAVEN NATIONAL LABORATORY
 FIGURE 6

proposed laboratory sites indicates a more favorable position for Camp Upton for both the initial, or first-year program, and for the five-year program as follows:

First-Year Program

	<u>Sandy Hook</u>	<u>Camp Upton</u>
Site Development	\$ 925,000	\$ 195,000
Laboratory Buildings	2,155,000	1,445,000
Pile and Electronuclear		
Machine Buildings	1,050,000	1,050,000
Air Conditioning	605,000	605,000
Utilities	775,000	475,000
Sea Wall	2,500,000	-
Additional Foundation Expense	400,000	-
Contingencies	<u>1,700,000</u>	<u>770,000</u>
	\$10,110,000	\$4,540,000

Five-Year Program

	<u>Sandy Hook</u>	<u>Camp Upton</u>	
Site Development	\$ 950,000	\$ 205,000	
Laboratory Buildings	5,415,000	5,415,000	
Pile and Electronuclear			
Machine Buildings	2,150,000	2,150,000	
Air Conditioning	1,445,000	1,445,000	
Utilities	1,880,000	1,730,000	
Sea Wall	2,500,000	-	
Additional Foundation Expense	1,000,000	-	
Contingencies	<u>3,000,000</u>	<u>2,000,000</u>	
	\$18,340,000	\$12,945,000	(D50)

As had been anticipated, the Air Force did take over Fort Slocum. Therefore, the relative merits of Camp Upton and Fort Hancock, as indicated in the engineering report, led to the final decision to request the government to make available the site of Camp Upton for the establishment of this new national laboratory. This request was made at the first meeting of the Board of Trustees of the New Jersey Corporation of AUI on July 10, 1946. At the first meeting of the New York corporation on July 30, the request was confirmed, with the additional recommendation that the target range be included, providing an additional area which might well prove useful for the chemical recovery of radioactive wastes.

The final selection, was naturally a compromise, since to satisfy all of the requirements outlined initially had proved impossible. Camp Upton has, however, proved to be a happy compromise. It is near New York City, just beyond commuting range, yet the immediately surrounding territory is very thinly populated, with less than 100 people living within a three-mile radius and approximately only 17,000 within a ten-mile radius. The water supply is ample, and the Long Island sand provides admirable foundation for heavy construction.

The existing Army structures on the four-square-mile main area have proved to be easily convertible into laboratories, so that the Laboratory has saved at least a year in getting its research under way. It is hoped that plane transportation, utilizing the flight strip two miles from the Laboratory gate, will permit improved access to the New England Institutions.

4. PROPOSED SCIENTIFIC PROGRAM

a. General

The nuclear reactor or chain-reacting pile, which was first developed during the war, is of course an essential tool for research in the new nuclear sciences. The primary reason for the establishment of the Brookhaven National Laboratory was to provide those special tools for nuclear research which were beyond the capacities in expense and manpower of individual state or privately endowed institutions. Since the nuclear reactors at Chicago, at Los Alamos in New Mexico and at Oak Ridge in Tennessee, are not readily accessible to scientists in the northeastern state, the construction of one or more nuclear reactors at Brookhaven was an essential part of the Laboratory's program for facilitating nuclear research in this region. In addition, the accelerators needed for further investigation of nuclear forces in the Bev (billion electron volt) energy region also involved a large construction program. Extensive investigation was required, however, to determine exactly which types of reactors and accelerators should be constructed at Brookhaven in order best to supplement and advance the research programs of the surrounding institutions. Subcommittees on Nuclear Reactors and on Electronuclear Machines, appointed by the Planning Committee on March 30, made detailed studies of the various phases of this question. Their reports underlay the decisions incorporated in the Proposed Program issued by IUG on May 31, 1946 (D57) and the more detailed Initial Program Report (D69) submitted to the AEC on December 15, 1946.

Around these special facilities, the reactors and accelerators, the scientific program for the Laboratory was planned. Following university practice, research work was to be conducted by Departments of Physics, Chemistry, Biology, Medical Research and Engineering. The groups responsible for planning, supervising the construction of, and operating the nuclear reactors and electronuclear machines were organized as task forces and were designated as Projects. All aspects of the Laboratory operation were placed under the direction and supervision of the Director. A scientific Advisory Committee, consisting of the scientist members of the Board of Trustees of AUI, was created to advise the Director in the formation of the research program of the Laboratory. This program was to be submitted in proposal form to the AEC for approval. The general aims of the research program, as set forth in the Initial Program Report of December 15, are as follows:

"The Laboratory will endeavor to learn more about the nature of the atomic nucleus, its internal constitution and its reactions to neutrons, electrons and protons, and to discover the nature and properties of mesons and other products of nuclear disintegration. Such studies should result in more certain control of atomic energy and nuclear reactions. In order to improve the chemical production and utilization of many materials, especially of tracer elements, the Laboratory

will seek to extend our knowledge about the nature and mechanism of chemical reactions and will study the methods of radioactive isotope preparation and separation.

"Along with these basic studies there will be a broad program to determine ways in which nuclear energy may be used to prolong human life and to control animal and vegetable life more effectively. This will involve such studies as the effects of radiations on the behavior of living organisms and investigation of the chemical and physical mechanisms of heredity.

"The powerful new tools provided at the Laboratory will permit intensive study of human metabolism and its variations under radiation of various kinds. Investigations may also be undertaken to learn more about the nature of cancer and other abnormalities of living cells. From such research will come inevitably a firmer basis for the more positive control, perhaps even the cure, of many diseases.

"In addition, there will be opportunities for the scientists and engineers of the Laboratory staff to improve the techniques of producing atomic power and preparing the radioactive isotopes that have already proved their usefulness in saving lives and in speeding the march of science.

"These are the broad overall purposes for which the facilities of the Brookhaven Laboratory are being prepared and a strong research staff recruited." (D69)

b. Nuclear Reactor Project

In accordance with these aims, the immediate objective of the Nuclear Reactor Project was clearly to provide this type of basic instrument of nuclear research as soon as possible for use by the institutions in the northeast. It was agreed to strive to complete Pile No. 1 within two years. The documents covering the details of the plans for the first reactor are classified, but the resume given here reveals the underlying philosophy.

The Sub-committee on Nuclear Reactors consisted of R. F. Bacher (Chairman), R. Coryell, J. V. Morrison, E. P. Wigner and H. R. Worthington, Jr. Their first report to the Planning Committee, on April 16, was summarized as follows:

"A group consisting of Dr. Wigner of Princeton, Dr. Drew of Columbia, Dr. Zinn from the Metallurgical Laboratory, and Dr. Soodak from Oak Ridge, met with Kistiakowski, Watson and Bacher from the Planning Committee on April 15 to discuss proposals for a nuclear reactor for the new National Laboratory. The reactors now planned for the Metallurgical Laboratory and for the Clinton Laboratories at Oak Ridge were discussed and a series of recommendations were prepared and presented to the Planning Committee which gave its general approval.

1. Since it is generally recognized that reactor construction for the National Laboratory should be for physical

experimentation, preparation of special radioactive materials, and for the study of reactor design and engineering, it was concluded that a long-range program on reactors must lead to the construction of more than one such unit.

2. The first nuclear reactor should be of intermediate power, about that of the pile at Oak Ridge.

3. This first reactor should be primarily for physical experimentation but with provision for irradiation of materials.

"With these general recommendations, some specific design proposals were made which could not be reported in detail. It was further recommended that a working design group be established immediately under the supervision of Dr. E. P. Wigner and that this group give first attention to a reactor using somewhat enriched material, a water moderator, and accordingly, operated in the moderate temperature range." (D26)

As the committee proceeded with its studies, details of the design were crystallized. The earlier intention to construct a water-cooled pile was modified in favor of an air-cooled design. In August, 1946, Dr. Lyle B. Borst of the Physics Department of Clinton Laboratories was placed in charge of the design and development of Pile No. 1. In the Initial Program Report, this pile is described as follows:

"The first reactor will be an air-cooled graphite-uranium pile similar to that at Oak Ridge but having several improvements. Although it is considered to be a low intensity instrument, its neutron flux will, nevertheless, exceed that of other existing experimental piles. Experimental facilities sufficient to accommodate an extensive research program will be incorporated in the original design." (D69)

c. Accelerator Project

The plans for construction of accelerators at the proposed laboratory were studied by a Sub-committee on Electronuclear Machines. This group, consisting of J. R. Zacharias (Chairman), M. S. Livingston, N. F. Ramsey, L. N. Ridenour, J. Schwinger and M. G. White, first met on April 14. It was agreed that electronuclear machines would best be considered in three categories: first, the equipment too expensive for construction or maintenance by a single institution; second, the supplementary equipment that would be required for a research program in fundamental physics; and third, the supplementary equipment required by biologists and chemists and for other research in the application of nuclear science. Which type of accelerator should be built at Brookhaven depended upon other accelerator construction programs in the northeast. The philosophy arrived at by the Sub-committee, after extensive study and discussion, was expressed in the Initial Program Report as follows:

"The most promising means of learning more about the nature of matter and of energy is the study of high energy particles and their interaction

with atomic nuclei. The investigation of cosmic rays which contain particles of the highest energy yet found has recently yielded the discoveries of positrons, mesons, and the conversion of radiation into matter. Further study of these particles and the search for new phenomena require the production of particles with cosmic ray energies under controlled laboratory conditions. It is, therefore, natural that a major part of the Brookhaven Laboratory program should be devoted to the design, construction and use of gigantic electronuclear machines that can produce such very high energy "bullets"...

"One can hardly specify now the exact design of the super-voltage machine (or machines). But it is vital that Brookhaven take a position of leadership in this field cooperating closely with Berkeley and other laboratories to produce a balanced program for the nation as a whole.

"Through the use of super-voltage machines our basic knowledge of the make-up of the nuclei of atoms and of the forces which hold them together should be immeasurably increased. There may also be exceedingly important biological and medical applications of these extremely high energy radiations. The practical benefits no scientist should venture to predict, but new methods of releasing atomic energy might be discovered. Of greater significance than the experiments that can be forecast for such equipment are the unpredictable ones involving the new phenomena that will be discovered with the machines themselves.

"In addition to its main program for the development of very high energy accelerators, Brookhaven must have several smaller electronuclear machines as adjuncts to other phases of the research effort. A 60-inch CW cyclotron is needed for preparation of certain radioisotopes vital to research in chemistry, biology and medicine and not obtainable from the pile or elsewhere. Existing designs will be used and most of the component parts purchased. Later it may also be desirable to procure an electrostatic generator (Van de Graaf machine) to produce 12 million volts since this is a flexible research tool uniquely adapted to study of resonance phenomena and excitation functions in nuclear reactions. These smaller machines have now become standard equipment for any large nuclear laboratories." (D69)

d. Physics Department

The programs for the Laboratory Departments were also presented in the December 15 Initial Program Report. The work of the Physics Department was outlined as follows:

"The chief functions of the Physics Department include: the developing of physical instruments for research with the nuclear reactors and the electronuclear machines of the laboratory; assisting the projects in the instrumentation and design of the reactors and machines; conducting physics research experiments; and theoretical research in the

design of the reactors and machines, in the theories of the experiments performed and planned and in the fundamental physics of nuclei and elementary particles...

"Considerable flexibility should be planned for the physics research program since it is almost certainly true that the experiments which will later prove to be the most important ones have not been invented as yet. Also at this stage it is reasonable to expect, and desirable to have, duplication between some parts of the general program here and that at other laboratories. Out of the more detailed planning that becomes possible as the work proceeds, new experiments and modifications arise. Also, some experiments are either so important or in such large fields that duplication is highly desirable. It will be important as work proceeds, however, for the Physics Department to be well informed of the research activities elsewhere so that unnecessary duplication can be avoided."

It was planned to initiate the activities of the Physics Department as soon as scientists could start work at the Laboratory site.

"The importance of starting the work of the Physics Department at the earliest possible date cannot be overemphasized. There is already an obvious immediate need for this department in the theoretical and instrumentation work required as a part of the design of the reactors and electronuclear machines. Also the design of the reactors, machines and associated buildings are affected by the nature of the contemplated experiments with the machines, so it is important that the thinking about the experiments be started before the plans for the major devices and buildings are completed"...(D69)

e. Chemistry Department

The plans for the Department of Chemistry were summarized as follows:

"This Department will devote itself to the study of the chemical aspects of atomic energy. From such studies will come a better understanding of the nature and constitution of substances, both organic and inorganic found in nature, and the chemical relationships between these substances. Methods are now available which may lead to the solution of problems which will result in improved human welfare. Such problems are the biological synthesis of proteins, the photosynthesis of sugars and cellulose, and the fixation of nitrogen by bacteria, to name a few. Many problems of a less spectacular nature may give results of equal benefit..."

The research program for the Chemistry Department will include:

- "Study of the effects of radiations on materials and on chemical processes.
- Calorimetric studies of energy evolution of radioactive substances and by neutron capture.
- Study of neutron beams and of the properties of isotopes (such as tritium) at liquid helium temperatures.

will be an integral part of the laboratory program. Such studies, which are a natural outgrowth of the research in the biological and physical sciences, will be the most direct application of these sciences to the relief of human diseases. The work of the Medical Research Department would be closely integrated with the Department of Biology, for in many cases the problems will be identical, but will be approached from a different point of view...

"Therapy would be carried out in cooperation with hospitals in the northeast region. While it is to be expected that a few of the patients will be brought from New York for treatment, facilities will be available for housing a limited number of patients for extended treatments. The chemical work will be carried out in treatment rooms built as integral parts of the nuclear reactors and high voltage accelerators...

"The development of specific radiation therapy might be extended beyond its present bounds. At the present time, radio-phosphorus is used for leukemia, and radioiodine is used for treating hyperthyroid. Other specific agents can undoubtedly be found...

"The laboratory research in the Department of Medical Research will be most closely related to the work in the Department of Biology... The tracing of food and drugs to determine their metabolism and mode of action... would be preceded by animal experiments.

"Because of the necessity of conducting medical research where the clinical material is available it is to be expected that initially a large part of the program will be carried out by the Brookhaven staff members working at cooperating medical schools and hospitals. In many cases this type of work will continue even after clinical facilities are established at the site..." (D69)

h. Engineering Department

A general outline of plans for an Engineering Department was also presented in this report.

"The Engineering Department will be important both as a research department and as an engineering center to cooperate with the Projects and the other Departments in the engineering aspects of their work. Many difficult engineering problems will have to be overcome in the design of reactors, electronuclear machines and other observational equipment and much engineering research will have to be carried out as part of a power pile program.

"Since the head of this Department has not yet been appointed, only a brief outline of the typical functions and probable organization of this department are given..."

The research program of the Engineering Department will include:

PROJECTED SCHEDULE, DEC.15, 1946. SCHEMATIC TECHNICAL PROGRAM **BROOKHAVEN NATIONAL LABORATORY**

PROGRAM TO BE MODIFIED FROM TIME TO TIME ON BASIS OF NEW FINDINGS AND AFTER CONSULTATION WITH SCIENTIFIC ADVISORY COMMITTEE

FIGURE 7

"Investigation of the effects of neutron and high voltage radiation on metallic structure.

Study of the fundamental engineering problems involved in nuclear power reactors, such as the problem of heat transfer, radiation protection, etc.

Study of the fundamental chemical engineering problems involved in the repurification of reactor fuels.

Investigation of the engineering problems connected with a power pile, such as the problems of the suppression of bubbles, handling of high-pressure, radioactive steam, etc.

Research and development on methods of isotope separation." (D69)

1. Schedule of Research Program

As indicated above, the times at which the work of these research groups would properly begin varied widely. The Projects would have to start as soon as possible, to provide the special facilities needed for other research. The instrumentation and service divisions in the Chemistry and Physics Departments would be required for the research work of any of the departments. On the other hand, much of the research would not need to get under way until the pile and some of the accelerating equipment were in operation. Figure 7 shows the proposed time chart for the Laboratory research program, as it was forecast in December 1946.

The Initial Program Report, submitted to the AEC on December 15, 1946, presented not only the general scientific plans quoted above, but also outlines of many other phases of the proposed Laboratory organization. The main body of the report presents the general aims of the Laboratory, while the six appendices cover the scientific program for the research departments (App. A), the plans for the nuclear reactor and accelerator projects (App. B), the organizational structure (App. C), the building program (App. D), the proposed budget (App. E), and the housing problem (App. F). Reference may be made to this document, (D69), for further information, as well as to the Quarterly Scientific Progress Report issued by the Laboratory April 1, 1947.

5. PLANS FOR STAFF AND FOR COOPERATION WITH RESEARCH INSTITUTIONS

During this early period of planning the problem of obtaining the necessary personnel for the Laboratory demanded particular attention. Scientists, especially in nuclear science, were returning from the war laboratories to aid in the establishment of enlarged programs in their own research institutions. So many obvious research problems called for immediate investigation that there was an appreciable reluctance among the scientists to join a program where research could not begin for at least a year. Thus, during the first months of thinking about how best to obtain scientific personnel for the national laboratory, a great deal of attention was given to provisions for part-time work, with consultants and visitors from the staffs of other institutions seen as a large fraction of the working staff of the Laboratory. This early philosophy is indicated in the first report submitted by the Subcommittee on Personnel Policy, dated April 16, 1946. The categories of personnel who would constitute the staff were

thought to be as follows:

- "1. Administrative
 - a. Scientific
 - b. Business, managerial and facilities
2. Permanent Scientific Staff
 - a. Senior Scientific staff
 - b. Junior Scientific staff
 - c. Fellows
3. "Floating" Scientific Staff
 - a. Consultants
 - b. Visitors
 - c. Members of Staff of Cooperating Institutions and others
 - d. Graduate Students"

The Committee felt that at this time it might be difficult to obtain personnel in a number of categories except on a leave of absence basis...

"Permanent staff is not ruled out but the leavening by "leave of absence" people will tend to arrest the almost inevitable development of a vested interest policy which a large organization seems to acquire. The Laboratory would thus be more responsive to the needs and necessities of outside institutions and industry.

"Junior Staff can also be of both varieties. It will be easier to recruit them on a permanent basis because a young man will have a great educational opportunity in this laboratory and a chance to make a name for himself under the eyes of some of the leading scientists in the country.

"By "Fellows" is meant young Ph.D's who wish to do a year or two of research before joining the staff of some organization. They can be paid either by the laboratory or stay on some outside stipend. The Laboratory for patent and other reason will probably prefer to put them on its own salary roll.

"Consultants. There will undoubtedly be people in the country who will be invited to visit the laboratory on a definite schedule to advance the scientific purposes of the laboratory. These consultants will be paid a fee and expenses according to arrangement.

"Visitors are people who come for a fairly short time to learn or observe for their own use. They are on their own and are not paid.

"Members of the staff of cooperating institutions will use the facilities of the laboratory. Indeed, this is one of the primary reasons for the existence of the laboratory. They will generally do this on an intermittent basis. However, their program of research will have in some manner to be acceptable to whatever "steering committee" governs the scientific policy of the laboratory. If the program is acceptable to the laboratory it is a part of the program

of the laboratory and should be supported by the laboratory certainly to the degree of paying the expenses and perhaps a portion of the salary of the individual concerned.

"These men and their graduate students should occupy a very important place in the life of the laboratory. Since graduate students nowadays almost all live on a stipend for which they perform a service, generally teaching, it will be necessary that they be paid either by the laboratory or by the university. Since the universities need their funds for teaching and their "on campus" research, it will be necessary to give these students temporary positions as assistants if they spend full time at the laboratory. If they spend part time, i.e., only a few days per week, the travel cost will be an important item. In most cases the full time arrangement after a man has completed his course work will be preferable.

"The existence of a number of "leave of absence" scientists on the Senior Staff will be of great help in maintaining proper relations with the universities with respect to graduate students.

"If a large portion of the Senior Staff is to consist of leave of absence men, the universities will have to make provision for them since the regular work of the university must go on. Some or most of the cooperating institutions will have to increase their staffs to have available personnel for "leave of absence" staffing of the National Laboratory. In turn the laboratory will have to agree to accept a certain number of the staff of the cooperating institutions so as not to leave them with the burden of supporting excess staff.

"In point of fact it is very unlikely that the universities will find themselves embarrassed in any way. A member of the Senior Staff for two years will have such exceptional opportunities for research and such exceptional knowledge and skill that he will be very greatly in demand. The numerous contacts which such men make with many scientists in many institutions will put them in such a position that the universities are more likely to worry whether they will get their men back rather than find themselves in the embarrassing position of possessing an excess of top-flight staff members." (D25)

In November 1945 the Manhattan District requested a committee headed by Drs. J. T. Tate and F. W. Loomis to propose a recommendation for basic policy to be applied in the staffing of the laboratories of the Manhattan District after the war. The resultant Tate-Loomis report* outlined job categories, salaries, and the basic structure for the scientific staff of these laboratories. This report was used in the preparation of the Proposed Personnel Policy for the new northeastern laboratory, and this was submitted to the AEC for approval along with the Draft No. 4 of the proposed contract (D68). This policy, developed largely in accordance with the prevailing practices in representative universities, includes provisions for annual leave, sick leave, transfer,

* preliminary draft submitted to Manhattan District, March 19, 1946. (D72)

insurance, retirement benefits, and establishes job classifications as bases for salary categories. It is most closely reminiscent of the arrangements established during the war in the NDRC laboratories. Figure 3 shows the proposed structure of the organization as it was anticipated in December, 1946. The security and clearance provisions were designed to be consistent with Manhattan District policy at the time, and were further modified in consonance with the Atomic Energy Act of 1946.

In recruiting personnel to work at the Laboratory it was anticipated that most of the maintenance staff, secretarial and clerical help and technicians would be drawn from among the residents of the central Long Island area. In most cases the scientists and key administrative personnel moved into the area from laboratories and universities all over the country. The problem of finding adequate housing for these people was seen as one of the most difficult facing the new laboratory. It was agreed that the development of a new city on the laboratory site was undesirable, so that only temporary or transient housing should be provided there. At the time of the termination of the Columbia contract, although little progress had been made towards a final solution, several of the initial members of the staff had already purchased homes in the communities surrounding the Laboratory.

Early ideas as to the growth of the Laboratory were stated as follows:

"Only approximate estimates can be made of the number of personnel likely to be at the Laboratory at the end of the third year...The distribution of senior to junior scientific staff will probably be roughly that found in a large university. The clerical (and maintenance) staff will be proportionately larger than usually obtained in a university, (because of the Laboratory's location) but somewhat smaller than that encountered in industrial laboratories...

"The research Fellows and between one-third and one-half of the Scientist categories will be on loan from cooperating universities, employed by the Laboratory for a period of one or more years. In addition, and not counted in the total, will be between 10 and 20 short-time visitors, come to pursue some special projects and not paid by the Laboratory...

"All of the estimates indicating the anticipated growth of the Laboratory are based on the assurance that the colleges and universities and the governmental and industrial laboratories of this northeastern section are eager to participate in the Brookhaven program. Arrangements for this as it relates to members of their staffs made available on leave will be flexible. If the work of such visitors is part of the authorized program of the Laboratory, and if they are to stay longer than six months, they may be appointed as temporary staff members of the Laboratory at salaries fixed by agreement with their parent institutions. If, on the other hand, a visitor does not wish to take active part in the Laboratory's administrative and research activities, but to pursue work of his own choosing, he will also be welcomed, provided his work is judged sufficiently related to the main program and there are facilities available; but he will not be paid a salary by the Laboratory." (D69)

PROPOSED ORGANIZATION CHART
BROOKHAVEN NATIONAL LABORATORY
AS OF JANUARY 1948 (ESTIMATED)

FIGURE 8

December 1946

Cooperation between Brookhaven and the nearby research institutions, as one of the Laboratory's essential functions, was to be provided for in a variety of ways. In general these provisions have been made so flexible that any arrangement which, on its own merits, is acceptable to the Laboratory, to the institutions concerned, and to the individual scientist, is likewise permitted within the provisions of the contract. A number of the anticipated relationships were set forth in greater detail in a memorandum prepared during January, 1947.

"A prime objective of the Brookhaven program is to meet the appropriate needs and interests of educational, governmental, and industrial research institutions of the northeastern district. Staff members of such institutions are invited to propose various ways in which institutions may participate in and actively cooperate with the Brookhaven program. In particular, comments are solicited upon the following suggestions. A research institution may:

1. Permit qualified staff members to render part-time advisory and consultant services in connection with the formulation and execution of the Brookhaven research program.
2. Grant leaves of absence to staff members who may wish to contribute to, or acquire training and experience by participating in, the Laboratory's research program.
3. Grant leaves of absence to staff members who may desire to use the facilities at Brookhaven on research projects originating with them. Such projects will require approval by the Brookhaven staff to assure that they are appropriate to the Brookhaven program and do not involve serious health hazards.
4. Suggest research projects for joint investigation by its own and Brookhaven's staff either at Brookhaven or at the Institution involved, or at both, depending upon the facilities required. Such a project would doubtless involve temporary assignment of Brookhaven staff members to the institution, and/or vice versa, for liaison and coordination.
5. Request consultant or advisory services of Brookhaven's staff in connection with the development of its own research program and facilities in the field of atomic science.
6. Grant leaves of absence to graduate students who wish to specialize in nuclear research by active participation in the Brookhaven research program, or by assisting in a research project sponsored by their own institution. Such students may be appointed as Research Fellows by Brookhaven National Laboratory, and it is hoped that suitable arrangements with their institutions in regard to supervision and publication can be made so that their work at Brookhaven may be used properly to fulfill the requirement of a doctorate thesis.

"Accommodations adequate for training several hundred graduate students and other young scientists each year are contemplated. Although Brookhaven will neither award degrees nor grant academic credit, it will be able to provide immediate staff supervision and nuclear research facilities that would otherwise not be available in this northeastern area. Thus, in effect, each of the participating institutions will have added to its laboratories, or facilities for graduate training, an extensive laboratory in atomic and related sciences which it could not have established and supported independently.

"Whenever staff members or graduate students from other institutions contribute to or participate in the research program undertaken by the staff of the Brookhaven National Laboratory, and approved by the Atomic Energy Commission, it is expected that they will be remunerated for their services by the Laboratory. Whenever, however, such workers are engaged on a project sponsored by their own institution, it is expected that they will be paid by their institution and that the Laboratory will provide the necessary facilities for the investigation." (D71)

At the time that the Columbia contract terminated, on January 31, 1947, 38 monthly salaried employees and 16 weekly or hourly employees were transferred to the AUI payroll. An additional 18 had been hired directly by the Laboratory during January so that by the close of business on February 1, 1947, the staff of the Brookhaven National Laboratory consisted of 72 people. In addition to these there was a staff of over 300, all employees of the War Department, who had maintained the Laboratory site in standby condition. These people were not transferred to the BNL payroll until March 21, 1947 when the site was formally taken over from the War Department.

6. AUI - FURTHER ORGANIZATION AND CONTRACT NEGOTIATIONS

Only two meetings were held by Associated Universities, Inc., the New Jersey Corporation, a meeting of the members on July 10, 1946, at which by-laws were adopted and other organization actions were taken; and a meeting of the Trustees on the same day. It was decided at the latter meeting to approve the site of Camp Upton for the Laboratory. No further meetings of the New Jersey Corporation have been called.

The first meeting of the incorporating trustees of Associated Universities, Inc., the New York Corporation, was held July 30, 1946 with all of the trustees, G. A. Brakeley, G. B. Pegram, I. I. Rabi, H. D. Smyth and W. W. Watson, present. At that meeting completion of incorporation on July 18, 1946 was reported, by-laws were adopted, the site of Camp Upton was approved for the Laboratory, it was decided to approach the nine cooperating universities in the matter of an advance of \$25,000 cash to provide working capital, the committees of the Initiatory University Group were constituted committees of the Board of Trustees, an Executive Committee was elected, the Board of Trustees was expanded to 18 and additional Trustees were elected as listed in Appendix B.

During the months of June, July and August, 1946, the Committee on Contract,

headed by Joseph Campbell, conducted many meetings with representatives of the Manhattan District as a result of which Draft No. 4 was prepared and was presented to the first meeting of the Executive Committee of Associated Universities, Inc. held September 9, 1946. After an extended discussion the Committee on Contract was constructed to report to the War Department that the contract as drafted was unacceptable to the Corporation in a number of respects and the contract was referred back to the Committee on Contract for further negotiation.

At the September 9, 1946 meeting of the Executive Committee the name Brookhaven National Laboratory was adopted upon unanimous vote as the name of the Corporation's laboratory to be located at the Camp Upton site, a form of Participation Fund Agreement was approved, and it was decided that the Corporation should have a small two or three room office in New York City. This decision led to the renting of the space now occupied at 393 Seventh Avenue, New York City.

In the interim between this and the next meeting of the Executive Committee, which was held September 27, 1946, further contract discussions were had with the Manhattan District and Draft No. 5 was prepared. At the September 27 meeting the Executive Committee recommended to the Trustees that the officers be authorized to enter into a contract with the War Department in the form of Draft No. 5 with such amendments in the interests of a free scientific effort as the officers deemed advisable and obtainable. This recommendation was approved at a meeting of the Trustees held later on the same day.

The first Annual Meeting of the Board of Trustees was held October 24, 1946. The trustees then serving were all reelected and were divided, pursuant to the by-laws (D56), into three classes to serve for one year, two years and three years, respectively. The Executive Committee, consisting of R. F. Bacher, G. A. Brakeley, P. S. Macaulay and J. R. Zacharias, was reelected, as were the President, E. Reynolds and the Treasurer, J. Campbell, all to serve until the next annual meeting. The Board empowered the Executive Committee to fill the offices of Executive Vice President, Assistant Treasurer and Secretary, and approved redesignation of the Planning Committee, composed of the nine Trustees representing the scientific departments of their universities, as the Scientific Advisory Committee.

At the November 9, 1946 meeting of the Executive Committee Eldon C. Shoup was appointed Executive Vice President and the selection of Dr. Philip M. Morse as Director of Brookhaven National Laboratory was officially confirmed. The resignation of T. I. Parkinson, Jr. as Secretary was accepted and Malcolm R. Warnock was elected Secretary and Assistant Treasurer. At this meeting bank accounts were authorized, the officers were instructed further with regard to the proposed contract, and the resignation of Dr. R. F. Bacher as a Trustee, a member of the Executive Committee and a member of the Scientific Advisory Committee was accepted. Dr. I. I. Rabi was elected a member of the Executive Committee in Dr. Bacher's place at the next meeting of the Committee held December 17, 1946. In August, 1946 and from time to time throughout the remainder of the year, the law firm Milbank, Tweed, Hope, Hadley and McCloy was consulted with respect to the proposed contract.

The Executive Committee at its December 17, 1946 meeting approved the proposed contract with the Manhattan District as then drafted, subject to one change being made, and the contract was signed on behalf of Associated Universities, Inc. later the same day. A few days later a number of changes in the contract requested

by General Groves were agreed to on behalf of Associated Universities, Inc. In the last week of December, 1946 Associated Universities, Inc. was advised that General Groves had asked Mr. Lilienthal whether the Atomic Energy Commission wished to review the proposed contract before it was put into effect in view of the fact that the Commission, which was to take office on January 1, 1947, would be bound under the contract, and that Mr. Lilienthal had said that the Commission would like to review the contract. The contract was accordingly not put into effect by the Manhattan District but was made the basis of a letter contract written by the Atomic Energy Commission under date of January 7, 1947. This letter contract and the proposed Manhattan District contract, referred to therein, embodied the contractual relationships between the Atomic Energy Commission and Associated Universities, Inc. on January 31, 1947, at which time the contract between the Commission and Columbia University relating to this matter expired.

Final Report of Work by Columbia University under Contracts W-7405-eng-50, W-31-109-eng-15 and AT-30-1-GEN-71

CALENDAR OF EVENTS

- 14 Jan 46 Dean G.B.Pegram* writes letters to research institutions, calling meeting to discuss nuclear science laboratory.
- 16 Jan 46 Conference at Columbia of representatives of research organizations in the Philadelphia to New Haven metropolitan region.
- 19 Jan 46 Dean Pegram's letter sent to Gen'l L.R.Groves on behalf of 19 organizations, proposing establishment of laboratory.
- 22 Jan 46 Gen'l Groves' reply proposing conference with Col. K.D.Nichols.
- 8 Feb 46 Dean Pegram, H.D.Smyth, H.S.Taylor, I.I.Rabi, confer with Col. Nichols.
- 16 Feb 46 Informal conference of representatives of departments of physics. Harvard, Johns Hopkins, M.I.T. now included.
- 2 Mar 46 Informal conference of representatives of departments of physics. Cornell and Rochester also included.
- 3 Mar 46 Dean Pegram's second letter to Gen'l Groves offering nine universities as direct sponsors.
- 9 Mar 46 H.D.Smyth confers with Col. Nichols and Scientific Advisory Committee of Manhattan District.
- 18 Mar 46 Dean Pegram's letter to nine presidents, summarizing status. Suggestion that single university be contractor with scientific program directed by board chosen from the larger universities.
- 26 Mar 46 Representatives from nine universities meet. Form Initiatory University Group (IUG). IUG Planning Committee formed, consisting of nine scientific representatives.**
- 27 Mar 46 Letter from L.A.DuBridge, IUG chairman, to nine presidents requesting representatives, one administrative and one scientific.
- 30 Mar 46 Planning Committee of IUG meets. Subcommittees formed:
- a) Subcommittee on Site**
 - b) Subcommittee on Contract
 - c) Subcommittee on Reactors
 - d) Subcommittee on Electronuclear Machines
 - e) Subcommittee on Personnel Policy
 - f) Subcommittee on Security and Classification
- 3 Apr 46 Date of supplement attached to Columbia University War Contract with Manhattan District, W-7405-eng-50, expiration date 30 June 46.

* see Appendix C for Index of Names.

** see Appendix B for membership of committees.

Appendix A

- 15,16 Apr 46 Planning Committee of IUG meets.
- 16 Apr 46 IUG meets. Subcommittees report. Dean Pegram appointed chairman of new Committee on Incorporation.
- 3 May 46 Planning Committee of IUG meets.
- 4 May 46 Planning Committee of IUG meets at Oak Ridge.
- 8 May 46 Stone and Webster engineers start survey of Camp Upton and Fort Hancock sites.
- 18 May 46 Planning Committee of IUG meets. R.F.Bacher elected new chairman, to replace Dr. DuBridge.
- 31 May 46 Planning Committee of IUG meets. Draft of Proposed Program approved.
- 1 June 46 IUG meets. R.F.Bacher elected new chairman. Draft of Proposed Program approved by IUG.
- 17 June 46 Planning Committee of IUG meets.
- 19 June 46 Planning Committee of IUG meets.
- 1 July 46 Date of Columbia War Contract with Manhattan District, W-31-109-eng-15.
- 6 July 46 Meeting of IUG Planning Committee.
- 8 July 46 Associated Universities Inc. incorporated in New Jersey.
- 10 July 46 First meeting of members of AUI, the New Jersey corporation. After report of Site Committee, resolution passed to request Camp Upton. Speech by Gen'l Groves stresses importance of training. Decision made to incorporate in New York.
- 18 July 46 AUI incorporated in New York.
- 30 July 46 First meeting of Board of Trustees of AUI, the New York corporation. Officers nominated and elected.
- 1 Aug 46 P.M.Morse selected as Director for new laboratory.
- 3 Aug 46 Planning Committee of AUI meets.
- 20 Aug 46 Press Release on appointment of P.M.Morse.
- 8 Sep 46 Participation Fund Agreement executed by nine universities.
- 9 Sep 46 Executive Committee of AUI has first meeting.
- 27 Sep 46 Executive Committee of AUI meets. Board of Trustees of AUI meets.

28 Sep 46 Press Release on name of BNL.

2 Oct 46 Meeting of AUI Planning Committee.

24 Oct 46 First Annual Meeting of AUI.

1 Nov 46 R.F.Bacher resigns from Executive Committee on appointment to AEC.

9 Nov 46 Executive Committee of AUI meets. E.C.Shoup appointed Executive Vice President.

10 Dec 46 Scientific Advisory Committee meets. I.I.Rabi nominated to Executive Committee, replacing R.F.Bacher.

15 Dec 46 Initial Program Report prepared for submission to AEC.

17 Dec 46 Executive Committee of AUI meets. I.I.Rabi appointed to replace R.F.Bacher.

1 Jan 47 With beginning of AEC, Columbia contract becomes AT-30-1-GEN-71.

7 Jan 47 Letter contract AT-30-2-GEN-16 for AUI to start operations.

13 Jan 47 First scientists move to Upton Site.

31 Jan 47 Work on Columbia contract terminated.

LISTS OF COMMITTEES

1. Policy Committees in IUG and AUI

University	IUG	IUG Planning Comm.	AUI	Executive Comm.
COLUMBIA	G.B.Pegram I.I.Rabi N.F.Ramsey (Exec.Sec'y)	I.I.Rabi N.F.Ramsey (Exec.Sec'y)	G.B.Pegram I.I.Rabi	I.I.Rabi (10/11/46--)
CORNELL	A.S.Adams R.F.Bacher (Ch 6/1/46--)	R.F.Bacher (Ch 6/1/46--)	A.S.Adams R.F.Bacher (--1/11/46) F.A.Long (1/11/46--)	R.F.Bacher (--1/11/46)
HARVARD	E.Reynolds G.B.Kistiakowsky	G.B.Kistiakowsky K.T.Bainbridge* J.H.Van Vleck*	E.Reynolds (Pres.) G.B.Kistiakowsky	E.Reynolds
JOHNS HOPKINS	P.S.Macaulay R.D.Fowler	R.D.Fowler P.Bard*	P.S.Macaulay P.D.Fowler	P.S.Macaulay
M. I. T.	J.R.Killian J.R.Zacharias	J.R.Zacharias J.C.Slater*	J.R.Killian J.R.Zacharias	J.R.Zacharias
PENNSYLVANIA	W.H.DuBarry L.N.Ridenour	L.N.Ridenour L.V.Schiff*	W.H.DuBarry L.N.Ridenour	
PRINCETON	G.A.Brakeley H.D.Smyth	H.D.Smyth M.G.White*	G.A.Brakeley H.D.Smyth	G.A.Brakeley
ROCHESTER	R.L.Thompson L.A.DuBridge (Ch --6/1/46) G.B.Collins*	L.A.DuBridge (Ch --6/1/46) G.B.Collins*	R.L.Thompson G.B.Collins	
YALE	E.W.Sinnott W.W.Watson	W.W.Watson E.C.Pollard*	E.W.Sinnott W.W.Watson	

* alternate scientific representatives

Appendix B

2. Subcommittees of IUG Planning Committee

a) Subcommittee on Site

N.F.Ramsey, Chairman
R.F.Bacher
H.D.Smyth
J.R.Zacharias

b) Subcommittee on Contract

H.D.Smyth, Chairman
G.A.Brakeley or R.J.Woodrow
J.R.Killian
P.S.Macaulay
G.B.Pegram

c) Subcommittee on Reactors

R.F.Bacher, Chairman
C.D.Coryell
J.V.Morrison
E.P.Wigner
H.R.Worthington, Jr.

d) Subcommittee on Electronuclear Machines

J.R.Zacharias, Chairman
M.S.Livingston
N.F.Ramsey
L.N.Ridenour
J.Schwinger
M.G.White

e) Subcommittee on Personnel Policy

I.I.Rabi, Chairman
L.A.DuBridge
R.D.Fowler
G.B.Kistiakowsky
F.W.Loomis
M.G.White

f) Subcommittee on Security and Classification

W.W.Watson, Chairman
H.D.Smyth

3. Committee on Incorporation

G.B.Pegram, Chairman
A.S.Adams
E.Reynolds
P.S.Macaulay
J.R.Killian
W.H.DuBarry
G.A.Brakeley
R.L.Thompson
E.W.Sinnott

4. Committee on Contract

J.Campbell, Chairman
F.W.Loomis
N.M.Sage
R.J.Woodrow
W.E.Kelley

INDEX OF NAMES

The full names of persons mentioned in the text are listed below. Abbreviations used here and in the text are defined in their alphabetical place in this same listing.

Adams, Arthur S. Provost, Cornell.

AEC. Atomic Energy Commission.

AUI. Associated Universities, Inc.

Bacher, Robert F. Commissioner, AEC; former Dean and Prof. Physics, Cornell.

Bainbridge, Kenneth T. Prof. Physics, Harvard.

Bard, Phillip. Director, Physiology Dept., Johns Hopkins Medical School.

Beeler, George W. (Colonel). Madison Square Area, Manhattan District.

BNL. Brookhaven National Laboratory.

Borst, Lyle B. Chairman, Nuclear Reactor Project, BNL, on leave from Chemistry Dept., M.I.T.; former senior physicist, Clinton Laboratory, Oak Ridge.

Bown, Ralph. Bell Telephone Laboratories.

Brakeley, George A. Vice-President, Princeton.

Campbell, Joseph. Asst. Treasurer, Columbia.

Collins, George B. Chairman, Physics Dept., U. of Rochester.

Coryell, Charles D. Prof. Chemistry, M.I.T.

Condon, Edward U. Director, National Bureau of Standards.

Day, Edmund E. President, Cornell.

Drew, Thomas B. Prof. Chemical Engineering, Columbia.

DuBarry, William H. Vice-President, U. of Pennsylvania.

DuBridge, Lee A. President, California Institute of Technology; former Chairman, Dept. Physics, U. of Rochester.

Dunning, John R. Prof. Physics, Columbia.

Fields, Kenneth E. (Colonel). Manhattan District.

Fowler, Robert D. Chairman, Chemistry Dept., Johns Hopkins.

Appendix C

Groves, Leslie R. (Major General). Commanding General, Manhattan District.

Harnwell, Gaylord P. Chairman, Physics Dept., U. of Pennsylvania.

IUG. Initiatory University Group.

Kelley, Wilbur E. Manager, Office of New York Directed Operations, AEC;
former Lieut. Colonel, Area Engineer, Madison Square Area, Manhattan District.

Killian, Joseph R., Jr. Vice-President, M.I.T.

Kistiakowsky, George B. Chairman, Chemistry Dept., Harvard

Kuper, Mariette K. (Mrs.J.B.H.). Executive Aide to the Director, BNL.

Lilienthal, David E. Chairman, AEC.

Livingston, M. Stanley. Chairman, Accelerator Project, BNL, on leave from
Physics Dept., M.I.T.

Loomis, F. Wheeler. Chairman, Physics Dept., U. of Illinois.

Macaulay, P. Stewart. Provost, Johns Hopkins.

Manhattan District. Corps of Engineers, War Department.

Masson, Henry T. Asst. Dean, Graduate Division, N.Y.U.

McCloy, John J. Legal counsel, member of firm of Milbank, Tweed, Hope, Hadley,
& McCloy.

Milbank, Tweed, Hope, Hadley, & McCloy. Law firm engaged as counsel for IUG.

Miller, J. Hillis. Deputy Commissioner of Education, New York State.

M.I.T. Massachusetts Institute of Technology.

Morrison, Philip. Assoc. Prof. Physics, Cornell.

Morse, Philip M. Director, BNL, on leave from Physics Dept., M.I.T.

Nichols, Kenneth D. (Brigadier General). Manhattan District.

N.Y.U. New York University.

Parkinson, Thomas I., Jr. Secretary to AUI, from firm of Milbank, Tweed, Hope,
Hadley and McCloy.

Patterson, Robert A. Assistant Director, BNL.

Pegram, George B. Dean, Graduate School, Columbia.

Pollard, Ernest C. Assoc. Prof. Physics, Yale.

Rabi, I. I. Executive Officer, Physics Dept., Columbia.

Ramsey, Norman F. Assoc. Prof. Physics, Harvard; Acting Chairman, Physics Dept., BNL, to Sept. 1947; former Assoc. Prof. Physics, Columbia.

Reynolds, Edward. Administrative Vice-President, Harvard.

Ridenour, Louis N. Dean, Graduate School, U. of Illinois; former Prof. Physics, U. of Pennsylvania.

Sage, Nathaniel McL. Director, Division of Industrial Cooperation, M.I.T.

Schwinger, Julian M. Prof. Physics, Harvard.

Shoup, Eldon C. Executive Vice-President, AUI.

Sinnott, Edmund W. Director, Sheffield Scientific School, Yale.

Slater, John C. Chairman, Physics Dept., M.I.T.

Smyth, Henry D. Chairman, Physics Dept., Princeton.

Stone and Webster Engineering Company. General engineers and contractors, Boston, Mass.

Taylor, Hugh S. Dean, Graduate School, and Prof. Chemistry, Princeton.

Thompson, Raymond L. Treasurer, U. of Rochester.

Van Horn, Emery L. Area Manager, Brookhaven Area, AEC; former Major, Area Engineer, Brookhaven Area, Manhattan District; Area Engineer, Tonowanda Area, Manhattan District.

Van Vleck, John H. Chairman, Physics Dept., Harvard.

Warnock, Malcolm R. Secretary and Asst. Treasurer, AUI.

Watson, William W. Chairman, Physics Dept., Yale.

White, Milton G. Prof. Physics, Princeton.

Wigner, Eugene P. Prof. Physics, Princeton.

Williams, Clarke. Scientist, BNL.

Woodrow, Raymond J. Executive Officer and Secretary, Princeton.

Worthington, Hood R., Jr. E.I. DuPont de Nemours & Co., Wilmington, Delaware.

Zacharias, Jerrold R. Prof. Physics, M.I.T.

Zinn, Wallace. Director, Argonne National Laboratory

BIBLIOGRAPHY

The letters, minutes of meetings, and other documents upon which this report is based are listed below. The reference numbers given at the left are used throughout the text to indicate the source of quotations and other information. All of these documents are on file at the Brookhaven National Laboratory. The entries that are starred (*) in this listing are included as Appendix E to this report.

- D1. Regional Nuclear Physics Research Center. Memorandum, from N.F.Ramsey, to G.B.Pegram et al. January 12, 1946.
- D2. Rough draft of proposed letter, from 15 institutions, to Gen'l L.R.Groves. January 16, 1946.
- D3. Meeting of Representatives of Institutions and Organizations of N.Y.C. & Surrounding Region. Minutes. N.F.Ramsey. January 16, 1946.
- D4. Letter, from G.B.Pegram, to Chairman, Dept. of Physics, U. of Penna. January 17, 1946.
- D5. Letter, from G.B.Pegram, to O.E.Buckley et al. January 17, 1946.
- *D6. Draft of Letter, from G.B.Pegram, on behalf of 19 institutions, to Gen'l L.R.Groves. January 17, 1946.
- D7. Letter, from Gen'l L.R.Groves, to G.B.Pegram. January 22, 1946.
- D8. Proposal for Establishment of a Northeastern Regional Laboratory for Nuclear Science and Engineering. J.C.Slater. February 9, 1946.
- *D9. Letter, from G.B.Pegram on behalf of 9 universities, to Gen'l L.R.Groves. March 3, 1946.
- D10. Memorandum, from G.B.Pegram, to participants in January 16 conference, transmitting copy of D9. March 5, 1946.
- D11. Letter, from G.B.Pegram, to J.B.Conant et al. March 18, 1946.
- D12. Resolution forming IUG. March 23, 1946.
- D13. Minutes of Meeting of Representatives of Universities concerning a National Nuclear Science Laboratory. N.F.Ramsey. March 23, 1946.
- D14. Letter, from L. A. DuBridge, to E.E.Day et al. March 27, 1946.
- D15. Possible Organization of Universities to Undertake Contracts. Memorandum. G.B.Pegram. March 30, 1946.

Appendix D

- D16. Summary of Meeting of Initiatory Group Planning Committee. N.F.Ramsey. March 30, 1946.
- D17. Tentative suggested budget for IUG through June 30, 1946. April 3, 1946.
- D18. Minutes of Informal Meeting of the Planning Committee. April 3, 1946.
- D19. Meeting of Sub-Committee on Electro-Nuclear Machines. Minutes. J.R. Zacharias. April 4, 1946.
- D20. Report on a meeting of the Subcommittee on Contract. April 8, 1946.
- D21. Outline of suggested by-laws. April 9, 1946.
- D22. Letter, from J.Hillis Miller, to G.B.Pegram, enclosing excerpts from New York State Education Law. April 11, 1946.
- D23. First Report and Request for Further Instruction. Memorandum (with Appendices A-L), to IUG Planning Committee, from Site Committee. April 15, 1946.
- D24. Notes on Modification by Planning Committee of recommendations in D19. J.R.Zacharias. April 16, 1946.
- D25. Report of Subcommittee on Personnel Policy. I.I.Rabi. April 16, 1946.
- D26. Resume of report by Subcommittee on Reactors. R.F.Bacher. April 16, 1946.
- D27. Summary of Meeting of IUG Planning Committee. N.F.Ramsey. April 16, 1946.
- D28. Minutes of Meeting of IUG. N.F.Ramsey. April 16, 1946.
- D29. Summary of Meeting of IUG Planning Committee. N.F.Ramsey. May 3, 1946.
- D30. Letter, from G.W.Beeler, to L.A.DuBridge. May 9, 1946.
- D31. Letter, from C.W.van der Merwe, to L.A.Dubridge. May 13, 1946.
- D32. Letter, from G.W.Beeler, to L.A.DuBridge. May 16, 1946.
- D33. Program Report of the Sub-Committee on Incorporation. G.B.Pegram. May 18, 1946.
- D34. Summary of Meeting of IUG Planning Committee. N.F.Ramsey. May 18, 1946.
- D35. Letter (enclosing draft of statement of purposes), from J.J.McCloy, to G.B.Pegram. May 21, 1946.
- D36. Letter (enclosing drafts of certificate of incorporation & by-laws), from J.J.McCloy, to G.B.Pegram. May 28, 1946.
- D37. Proposed Program for the New National Laboratory of Nuclear Science. Proposed draft. May 31, 1946.

- D38. Summary of Meeting of IUG Planning Committee. May 31, 1946.
- D39. Minutes of Meeting of IUG. June 1, 1946.
- D40. Committees of IUG. Outline. June 1, 1946.
- D41. Letter, from P.S.Macaulay, to G.B.Pegram. June 5, 1946.
- D42. Letter, from G.B.Pegram, to J.J.McCloy. June 6, 1946.
- D43. Letter, from G.B.Pegram, to P.S.Macaulay. June 7, 1946.
- D44. Letter, from G.W.Beeler, to R.F.Bacher. June 12, 1946.
- D45. Letter, from J.J.McCloy, to G.B.Pegram. June 13, 1946.
- D46. Summary of Meeting of IUG Planning Committee. N.F.Ramsey. June 19, 1946.
- D47. Letter, from G.B.Pegram, to Members of Committee on Incorporation. June 18, 1946.
- D48. Letter, from G.W.Beeler, to R.F.Bacher. June 21, 1946.
- D49. Letter, from G.W.Beeler to N.F.Ramsey. July 1, 1946.
- D50. Real Property - Surveys. Stone & Webster Report. July 3, 1946.
- D51. Summary of Meeting of IUG Planning Committee. July 6, 1946. (2:00 pm)
- D52. Summary of Meeting of IUG Planning Committee. July 6, 1946. (10:15 am)
- D53. Outline of IUG. July 8, 1946.
- D54. Minutes of the First Meeting of AUI (a New Jersey Corporation). T.I.Parkinson, Jr. July 10, 1946.
- D55. Letter (enclosing proposed by-laws for New York Corporation), from T.I.Parkinson, Jr., to G.B.Pegram. July 26, 1946.
- *D56. By-Laws, Associated Universities, Inc. (a New York Corporation). July 28, 1946.
- D57. Minutes of the First Meeting of Incorporating Trustees. T.I.Parkinson, Jr. July 30, 1946.
- D58. Minutes of the Meeting of the Planning Committee. N.F.Ramsey. August 3, 1946.
- D59. Participation Fund Agreement. August 8, 1946.
- D60. Press Release (P.M.Morse appointed director). August 20, 1946.
- D61. Minutes of the First Meeting of Executive Committee. T.I.Parkinson, Jr. September 9, 1946.

Appendix D

- D62. Memorandum (enclosing D63, D64), from T.I. Parkinson, Jr., to Trustees. September 27, 1946.
- D63. Minutes of Meeting of the Board of Trustees. T.I. Parkinson, Jr. September 27, 1946.
- D64. Minutes of a Meeting of the Executive Committee. T.I. Parkinson, Jr. September 27, 1946.
- D65. Press Release. (Nuclear Science Project at Camp Upton Names "Brookhaven National Laboratory"). September 28, 1946.
- D66. Letter, from J.R. Killian, Jr., to Trustees. September 30, 1946.
- D67. Minutes of Meeting of the Planning Committee. October 2, 1946.
- *D68. General Personnel Policy. (Appendix A to Draft No. 4, Contract W-42-069-eng-16). November 9, 1946.
- D69. Initial Program Report of Associated Universities, Inc. (with appendices A-F). December 15, 1946.
- *D70. Letter Contract No. AT-30-2-GEN-16, from E.E. Kirkpatrick (AEC), to Associated Universities, Inc., attention: E. Reynolds, President. January 7, 1947.
- D71. Brookhaven National Laboratory. Leaflet. January 9, 1947.
- D72. Letter (Tate-Loomis Report), from F.W. Loomis et al, to Gen'l K.D. Nichols. March 19, 1946.

MAJOR DOCUMENTS

The following documents are included with this report as supplementary material. The reference number refers to the listing in Appendix D above. Entries D68 and D69 have been bound under separate cover. Copies are available at the Brookhaven National Laboratory.

<u>Reference Number</u>	<u>Document</u>
D6	Draft of Letter, from G. B. Pegram, on behalf of 19 institutions, to Gen'l L. R. Groves. January 17, 1946.
D9	Letter, from G. B. Pegram, on behalf of 9 universities, to Gen'l L. R. Groves. March 3, 1946.
D56	<u>By-Laws, Associated Universities, Inc. (a New York Corporation).</u> July 28, 1946.
D68	<u>General Personnel Policy.</u> (Appendix A to Draft No. 4, Contract W-42-069-eng-16). November 9, 1946. (separate cover)
D69	<u>Initial Program Report of Associated Universities, Inc. (with Appendices A - F).</u> December 15, 1946. (separate cover)
D70	<u>Letter Contract No. AT-30-2-GEN-16,</u> from E. E. Kirkpatrick (AEC), to Associated Universities, Inc., attention: E. Reynolds, President. January 7, 1947.

DRAFT OF PROPOSED LETTER

January 17, 1946

Major General L. R. Groves
New War Department Building
Washington 25, D. C.

Dear General Groves:

It is understood that a considerable expansion of the Clinton Laboratories for research in the nuclear sciences and reconstruction of many of the facilities there are contemplated. If new developments are to be undertaken, representatives of the organizations listed below believe that a relocation of the laboratory should be considered. In particular it is believed that both of the work of the laboratory and the progress of science as a whole can best be promoted by locating such a laboratory in a place easily accessible to New York City and the surrounding area. This letter is to request that a regional research laboratory in the nuclear sciences be established near New York City and to urge consideration of the desirability of making the contemplated new developments in this region instead of at Clinton. The institutions and research organizations sponsoring this letter would be glad to assist and cooperate with such a laboratory. Many other organizations in this area, which on account of lack of time have not been consulted as yet, will certainly have the same attitude.

Our reasons for believing that a location somewhere in the region around New York City is the most suitable for such a laboratory include the following:

1. The scientific and cultural advantages of the New York City region including parts of Connecticut, New York, New Jersey and Pennsylvania will greatly increase the attractiveness of employment in the laboratory. Members of the laboratory staff should and would have the opportunity of studying at leading universities.
2. It is essential for the progress of science and engineering and the prosecution of cooperative experiments and developments that the laboratory be close to such an important scientific and engineering center as this metropolitan area.

As an illustration of the fact that this region is by far the chief center for scientists within the United States, the following figures based on the most recently published (1942) information as to the location of members of the American Physical Society is cited:

700 members reside within 80 miles of New York City, 383 of these in New York City itself. These residents of Connecticut, New York and New Jersey make up 21% of the total U. S. Membership of the Society. With the Philadelphia area included, this percentage rises to more than 24%.

January 17, 1946

These figures are to be contrasted with the other leading centers for physics which contain the following percentage of the total number: California, 7%; District of Columbia, Maryland and Virginia, 9% in total; Illinois, 6%; Massachusetts, 8%.

3. The large number of distinguished scientists and engineers in this area will make much talent available for consultation by members of the laboratory. The importance of this is obvious.

Opportunity for the laboratory to utilize on a part-time basis the services of local scientists who are unable or unwilling to be employed full-time will be a source of much strength to the laboratory.

4. This metropolitan area offers the advantages of rapid procurement of materials needed in research, large stocks of such materials, numerous technical facilities and specialized personnel.
5. Security of information and avoidance of hazard to surroundings need no longer be controlling factors in the location of a laboratory for nuclear studies. Appropriate security and safety can be attained as readily in this area as in a remote district. There are numerous large tracts of land in this region which can be procured for costs not out of proportion to the construction and operating costs of such a laboratory.

This letter is submitted to request that a regional research laboratory in the nuclear sciences be established in this area and to urge consideration of the desirability of making extensive new developments in this region instead of at Clinton.

Representatives of the group of organizations sponsoring this letter will be glad to confer on this matter when and where you may desire.

Respectfully submitted on behalf of, and as authorized by, the nineteen organizations named below,

George B. Pegram

Bartol Research Laboratory, Swarthmore, Pa.

Bell Telephone Laboratories, N.Y.C.

Board of Higher Education, New York City
(Representing C. C. N. Y., Hunter College,
Brooklyn College and Queens College)

Carnegie Institution of Washington
Department of Genetics, Cold Spring Harbor, N.Y.

Columbia University, N.Y.C.

Cornell University Medical College, N.Y.C.

Fordham University, N.Y. C.

January 17, 1946

Long Island College of Medicine, N.Y.C.

Memorial Hospital, N.Y.C.

New York University, N.Y. C.

Polytechnic Institute of Brooklyn, N.Y.C.

Princeton University, Princeton, N.J.

Research Corporation, N.Y.C.

Rockefeller Institute for Medical Research, N.Y.C.

Rutgers University, New Brunswick, N.J.

Standard Oil Development Company

Stevens Institute of Technology, Hoboken, N.J.

University of Pennsylvania, Philadelphia, Pa.

Yale University, New Haven, Conn.

March 3, 1946

Major General Leslie R. Groves
Manhattan District
Post Office Box 2610
Washington, D. C.

Dear General Groves:

Attached is a second communication which I have been authorized to transmit to you concerning a proposed laboratory for nuclear science to be located in this Northeastern region. This time the communication is on behalf of universities all the way from Baltimore to Cambridge. Professor John R. Dunning has kindly undertaken to deliver this to you tomorrow afternoon. Four copies are sent with the letter.

Sincerely yours,

George B. Pegram

GBP:rb

March 3, 1946

Major General Leslie R. Groves
Manhattan District
Post Office Box 2610
Washington, D. C.

Dear Sir:

We believe that it is essential to the national interest that the scientific, engineering, and industrial resources of this country be utilized as fully as possible for the development of atomic energy. In planning a program to this end we believe that the need for assuring the best personnel for this task and of training personnel for future work is comparable in importance to the research that can be done in the immediate future. In terms of scientific and technical personnel, and of research and educational facilities, the resources of the northeastern part of the country are greater than those of any other section. At present these resources are not being used extensively for atomic energy work; we believe they can be used fully only by the establishment of a major government laboratory in this area.

In recent weeks, such a belief has prompted two different groups of universities in this area, one from the New York region, one from the Boston region, to approach you or your representatives with reference to the establishment of a laboratory for nuclear science and engineering to

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supplement those already in existence at Oak Ridge, Tennessee; Los Alamos, New Mexico; Berkeley, California; and Chicago, Illinois. Representatives of these two groups have now met together and combined their programs into the proposal submitted in the present communication.

The proposal is that the Manhattan District take immediate steps for the establishment in this area of a nuclear laboratory including a major chain reacting pile. This proposal is directly sponsored by nine universities, Columbia University, Cornell University, Harvard University, The Johns Hopkins University, The Massachusetts Institute of Technology, Princeton University, University of Pennsylvania, The University of Rochester and Yale University. It is being presented for approval and support to a number of other universities, and research and medical institutions in the northeastern area (New York, New England, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia).

In giving a detailed account of the reasons for proposing such a laboratory, of the ends which it would serve, and of the way in which it might be set up and operated, we shall consider 1) The Scientific Resources of the Northeast, 2) The Interest in Nuclear Science and Engineering, 3) The Need of Combined Action, 4) The Educational Function of a Northeastern Laboratory, 5) Methods of Collaboration between the Universities and a Northeastern Laboratory, 6) The Permanent Organization of the Laboratory, 7) The Proposal, and 8) The Need of Prompt Action.

1) The Scientific Resources of the Northeast. The scientific and industrial strength of the northeastern section of the country is well known. Between a third and a half of all the scientists and engineers who might be brought into an atomic energy program are

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located in this district, and at least as large a fraction of the industrial companies concerned. The universities of the area are experienced in the handling of large undertakings. They sponsored some of the most extensive projects of the Office of Scientific Research and Development, and understand the problems of organization and personnel, of financial responsibility, of large scale research and development, of security, of relationships to government bodies and the armed services, which would be concerned in a large laboratory of nuclear science and engineering. Many of the scientists and engineers of the area held positions of wide executive and administrative responsibility in the various war laboratories. As a reservoir of talent on which to draw for a large laboratory of nuclear science and engineering, it would be almost impossible to find anywhere a comparable area.

2) The Interest in Nuclear Science and Engineering. The scientists and engineers of the northeast are convinced that the future developments of nuclear science and engineering will be of the very greatest importance. Increased knowledge of the fundamental nature of matter, the application of radioactive tracer methods to the study of physical, chemical, and biological processes, the use of radioactive materials for therapy, and the study of large scale radioactive transformations with a view to the production of power, will be developments with the greatest effort of which they are capable. Many of them are already going into such problems on a scale which before the war would have seemed impossible. New buildings, new machines, for the production of high energy particles, new chemical and metallurgical and engineering programs, new interest on the part of biological and medical men, are to be found on every side. These are not ephemeral developments. The universities have a stability possessed by few other institutions, and their interest in these problems is of such a fundamental nature that they can be counted on to carry on a continuing program, and to carry through the many great problems involved to a successful conclusion.

3) The Need of Combined Action. The research which will be needed for a really effective program in nuclear science and engineering depends on certain apparatus and facilities too large in scale for any single university to undertake. Eventually a northeastern laboratory should contain piles for production of neutron beams for physical experiments, for production of radioactive substances (such as could not be shipped from other laboratories), and for experimentation on the nature and construction of piles themselves. It should contain the necessary facilities for chemical, metallurgical, and engineering experiments with large quantities of radioactive materials. It might eventually contain very large machines for the acceleration of high energy particles. It should contain extensive medical and biological facilities, both for health control and for research in the biological aspects of radioactivity.

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The universities are anxious to see such a laboratory established in the immediate future, so as to bring the maximum effort of scientists and engineers to bear on the problems of nuclear science and engineering.

4) The Educational Function of a Northeastern Laboratory. The present undersupply of workers in nuclear science and engineering is critical, and the only way to bring it to an end is to train young men. It would be fatal to the progress of the whole field if the leading figures were drawn into a purely research laboratory and took no part in teaching. The proposed Laboratory would in no way take over the educational functions of the universities, but would supplement them in a very useful way, by allowing staff members and graduate students to engage at the Laboratory in research of a type too extensive to be carried on at the universities. In medicine, as well as in science and engineering, it could be of great value, in training medical men in the techniques and methods of the application of radioactive methods to medical problems. Permanent staff members of the laboratory who wished more graduate training could make arrangements for leaves of absence or part-time work to carry on graduate study at the various cooperating universities.

5) Methods of Collaboration between the Universities and a Northeastern Laboratory. If a nuclear laboratory were set up in the northeastern area, the scientists all realize that it could not be near enough to most of them to be very readily accessible. It would probably be impossible for most of them to spend part of a day at the laboratory, part at their own institutions. It does seem entirely possible, however, to find a site so located that a man could leave his university after work one day, travel either in the evening or at night, spend the next day at the nuclear laboratory, and return to his own university the next evening or night. For instance, a site within a relatively short automobile ride of one of the railroad stops of the Pennsylvania or New Haven railroads between Washington and Boston would have this property, for the great majority of the scientists of the area. We believe that if this degree of accessibility were achieved, a great deal of collaboration between the universities and the nuclear laboratory could be obtained. It would be perfectly feasible for a man whose major work was at the university to spend one or two days a week at the laboratory and supervise research going on there, provided there were adequate research associates or other staff members in residence to keep the work going. Others would want to go less frequently, a day every two weeks or every month, to keep abreast of what was going on. Many pieces of work going on in the nuclear laboratory would be correlated with other work going on in the universities, and the staff members of both projects would have to get together frequently. There would be certain facilities available in the laboratories of the cooperating institutions which

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would not need to be duplicated in the nuclear laboratory. Altogether the universities could make a very large contribution to the research of the northeastern laboratory.

6) The Permanent Organization of the Laboratory. It is clear that a laboratory of the scale contemplated must have a very substantial permanent organization in addition to the part-time members of the universities who would take part in its activities. There would have to be a strong management handling general direction, personnel problems, business problems, security and health administration, liaison with government bureaus and the armed services, and liaison with the universities and with industry. There would have to be a large permanent staff of employees, technicians, secretaries, guards, etc. Furthermore, there would have to be a permanent scientific staff. The management would have to bear the responsibilities involved in handling large and expensive projects with the problems of security and safety pertaining to such a laboratory, and at the same time would need the scientific understanding required to direct a laboratory which would make a real contribution to knowledge and to technology.

7) The Proposal. Since such a nuclear laboratory must be dependent on government support, and the Manhattan District is the government agency now able to give that support, the universities of the northeastern area unite in requesting the aid of the Manhattan District in setting up such a laboratory. They will be glad to take the lead in organizing the laboratory, and to appoint committees of their members to consult with representatives of the Manhattan District in making plans. Preliminary discussion among representatives of the sponsoring universities has shown agreement on certain points. We believe that the laboratory should be operated by a single institution as contractor, preferably a single university, but that the scientific direction should be in the hands of a board representing the sponsoring institutions and appropriate government agencies. This directing board could be set up in an appropriate legal form intermediate between the government and the operating institutions or, preferably, its powers could be defined in the contract with the operating institution. Naturally the operating institution would subcontract for construction and possibly for certain phases of operation. These are merely suggestions which would obviously have to be discussed by representatives of the Manhattan District and of the sponsoring institutions.

8) The Need for Prompt Action. the northeastern area has not inherited from the war an operating laboratory of nuclear science and engineering. The scientists and engineers of this area are marking time, as far as the activities are concerned which would be carried on at the proposed nuclear laboratory. If there is much further delay, they will become so much immersed in other activities that they will no longer be available for this field of activity. Furthermore, if the pattern becomes established of supporting the laboratories of nuclear science and engineering in the southeast, the middle west, and the west coast, but not the

March 3, 1946

northeast, it will become increasingly difficult to establish a laboratory in this area which will make full use of the unequalled facilities of the area for the public interest. We urge action as rapidly as is possible, so that a real beginning can be made while the district is still in existence. We see no virtue in waiting until an atomic energy commission is set up. Such a commission can hardly fail to wish to use the facilities of the northeastern area for research in nuclear science and engineering. If it so wishes, it can hardly fail to consult the universities of this area for a proposed program, and our recommendations to any atomic energy commission would be based on the same premises underlying our present request. Everything is therefore to be gained by action, and the District by such action could gain the satisfaction of feeling that it had assisted in the formation of an enterprise which would be bound to command the whole-hearted support of a very substantial area of the country, and which would be certain as it developed to contribute in an enduring and vital way to the public welfare.

To summarize, we believe that (1) the resources of the northeast should be used to promote research in nuclear science and the training of personnel for such research; (2) these ends can be most effectively served by a large scale government supported laboratory in this area; (3) the universities and research institutions in this area can and will cooperate to insure the success of such a laboratory; (4) initial steps toward such a laboratory can and should be taken promptly.

Representatives of the universities sponsoring this letter will be glad to confer on this matter when and where you may desire.

Respectfully submitted on behalf of, and as authorized by representatives of, the nine universities named hereunder.

George B. Pegram
Chairman of the group of representatives
of the nine universities.

March 3, 1946

Columbia University

Cornell University

Harvard University

The Johns Hopkins University

Massachusetts Institute of Technology

Princeton University

University of Pennsylvania

University of Rochester

Yale University

GBP:rb

ASSOCIATED UNIVERSITIES, INC.
(A New York Corporation)

BY-LAWS

ARTICLE I

Cooperating Universities

Section 1. The cooperating universities will be: Columbia University, Cornell University, Harvard University, The Johns Hopkins University, Massachusetts Institute of Technology, Princeton University, Yale University, University of Pennsylvania, University of Rochester and such other universities and institutions as may be associated with them by unanimous consent.

ARTICLE II

Board of Trustees

Section 1. There shall be a Board of Trustees, composed of two Trustees designated by, and under the seal of, each cooperating university or institution as described in ARTICLE I hereof, one Trustee of each such university to be a principal administrative or corporate officer thereof. In addition, the President, during his term of office, if he is not a Trustee by previous election, shall serve as Trustee ex officio.

Section 2. The Board of Trustees shall hold an annual meeting in October of each year. Regular meetings of the Board of Trustees shall be called at such times as the Board may determine by majority vote and special meetings shall be called at any time by the Secretary or any Assistant Secretary upon request of the President or on the written request of any Trustee.

Section 3. Notice of each regular meeting of the Board addressed to each of the Trustees shall be deposited in the mail at least ten (10) days, and notice of each special meeting at least seven (7) days, before the meeting.

Section 4. The Board of Trustees shall have and exercise full power in the management and control of the activities and affairs of the corporation.

Section 5. Trustees, other than the President serving ex officio, shall be classified, with respect to the time for which they shall severally hold office, by dividing them into three classes, each class to consist of six (6) Trustees and to be created upon division by the President at the first annual meeting; provided, however, that such division shall not result in both Trustees representing any one university or institution becoming Trustees of the same class. Trustees of the first class shall serve for the term of one (1) year, Trustees of the second class shall serve for the term of two (2) years and Trustees of the third class shall serve for the term of three (3) years, and at each annual election of the Trustees the successors to the class of such Trustees whose terms shall expire in that year shall be elected Trustees for a term of three (3) years, so that the term of office of one class of such Trustees shall expire in each year, but each such Trustee, of whatever class, shall hold office until his successor shall have been elected and shall qualify, or until his death, or until he shall resign. In the case of any increase or decrease in the total number of Trustees, each class shall be respectively increased or decreased so that after any such increase or decrease such class shall consist as nearly as possible of one-third of the whole of the Board of Trustees.

Section 6. At each annual meeting of the Trustees, the successors to those Trustees whose terms then end in accordance with Section 5. of this ARTICLE shall be elected subject to Section 1. of this ARTICLE by vote of a majority of the other Trustees then remaining in office.

Section 7. In case of a vacancy upon the Board of Trustees for any cause other than expiration of term, the same shall be filled for the unexpired term on majority vote of the remaining Trustees from candidates designated by, and under the seal of, the university or institution theretofore represented by the office left vacant; subject, however, to the provisions of Section 1. of this ARTICLE.

Section 8. A quorum for the transaction of the business of the Board of Trustees shall consist of a majority of the whole Board but less than a quorum shall have power to adjourn from time to time until a quorum is present.

ARTICLE III

Officers

Section 1. The officers of the corporation shall consist of a President, a Secretary and a Treasurer and such Vice Presidents, Assistant Secretaries and Assistant Treasurers as the Board of Trustees may from time to time determine to appoint.

Section 2. The officers of the corporation shall have the powers and perform the duties which usually pertain to their respective offices, with such limitations or additions as may be prescribed by the Board of Trustees.

The President shall be the principal executive officer of the corporation.

Section 3. An officer may receive such reasonable compensation as may be determined by the Board of Trustees.

Section 4. The officers shall be elected at the annual meeting and shall hold office until the next annual meeting and until their successors are elected. The Board of Trustees shall have power at any special meeting to fill any vacancy for the unexpired term.

Section 5. An officer, other than the President serving ex officio, need not be a Trustee.

ARTICLE IV

Executive Committee

Section 1. There shall be an Executive Committee composed of the President and four (4) other Trustees. The members of the Committee, other than the President, shall be elected at the annual meeting of the Board of Trustees to hold office until the next annual meeting and until their successors are elected. In case of a vacancy in the Executive Committee, the same may be filled by the Board of Trustees at any meeting; or, in the interim between meetings of the Board, may be filled temporarily by vote of a majority of the remaining members of the Executive Committee. In case of the absence of a member from any meeting of the Committee, the President may appoint a Trustee who shall attend such meeting in the place of the absent member of the Committee and exercise any and all powers which such absent member might have exercised.

Section 2. The President of the corporation shall be the Chairman of the Executive Committee.

Section 3. A quorum for the transaction of the business of the Executive Committee shall consist of three members. Notice of all meetings shall be deposited in the mails at least forty-eight (48), or given by telephone or telegraph at least twenty-four (24), hours before the meeting.

Section 4. Subject to applicable provisions of law and to the direction of the Board of Trustees, the Executive Committee shall, in the intervals between the meetings of the Board of Trustees, have the immediate charge, management and control of the activities and affairs of the corporation and it shall have full power to do any and all things in relation to the activities and affairs of the corporation, and to exercise any powers of the Board of Trustees, which are not specifically required by law or by these By-Laws to be done or exercised by the full Board.

ARTICLE V

Nominating Committee of Board

Section 1. There shall be a Nominating Committee of the Board of Trustees composed of not more than three (3) Trustees to be appointed by the Board at each annual meeting.

Section 2. At least ten (10) days prior to the next succeeding annual meeting, the Committee shall select, and at the time of such meeting shall present to the Board, one or more nominations for each officer of the corporation to be elected at the meeting.

ARTICLE VI

Other Committees

Section 1. The Board of Trustees may appoint from time to time such other committees, either of the Board or otherwise, as the Board may deem advisable, in addition to those specifically provided by these By-Laws,

and each such committee shall exercise such powers, follow such procedures and perform such duties as may be delegated to it, or prescribed for it, by the Board of Trustees.

ARTICLE VII

Director

Section 1. There shall be a director to supervise the scientific and research activities of the corporation in accordance with policies established by this Board, its Committees and officers.

Section 2. The Director shall be selected by the Board of Trustees under procedures to be established by resolution.

ARTICLE VIII

Fiscal Year

Section 1. The fiscal year of the corporation shall commence on the 1st day of July and end on the 30th day of the following June.

ARTICLE IX

Seal

Section 1. The seal of the corporation shall be circular in form and shall bear the name of the corporation and the state and year of its incorporation.

ARTICLE X

Amendments

Section 1. Amendments relating to ARTICLE I and ARTICLE II, Section 1, Section 5, Section 6 and Section 7 hereof shall require the unanimous vote of the Trustees present at any meeting of a quorum held pursuant to notice specifying the proposed amendments.

Section 2. All other amendments hereto may be effected by majority vote of the Trustees present at any meeting of a quorum held pursuant to notice specifying the proposed amendments.

UNITED STATES
Atomic Energy Commission

7 January 1947
Letter Contract No. AT-30-2-Gen-16
Oak Ridge, Tennessee

Associated Universities, Inc.
393 Seventh Avenue
New York, New York

Attention: Mr. Edward Reynolds, President

Gentlemen:

It is the understanding of the Atomic Energy Commission that Associated Universities, Inc. is prepared to establish, operate and maintain for the government a comprehensive atomic energy research laboratory, to be known as the Brookhaven National Laboratory, at the site of Camp Upton on Long Island, New York, all as evidenced by proposed Contract No. W-42-069-eng--16 between Associated Universities, Inc. and the United States, represented by the Manhattan Engineer District, War Department. This proposed contract was negotiated by the United States with Associated Universities, Inc. and signed by the President of your corporation, but as yet has not been executed formally by the government.

It is the Commission's intention, as already expressed in a telegram from the Chairman to the President of your corporation dated 27 December 1946, that without delay Associated Universities, Inc. shall press ahead with the development of plans and arrangements, including the recruitment of a staff, for the early establishment of the Brookhaven National Laboratory. However, the commission desires to review fully the terms of proposed Contract No. W-42-069-eng-16 to make certain that they are consistent with the Atomic Energy Act of 1946 and the Commission's policies. It is the purpose of this letter to inform you, in order to insure that the Brookhaven Project will not be delayed during the Commission's review, that it is the intention of the Atomic Energy Commission (1) to enter into a definitive contract with you for the purposes herein described and pending further negotiation and execution of the definitive contract.

This letter of Intent is offered on the following express conditions:

1. There will be made available to you to finance the performance of the work herein described the sum of two million dollars (\$2,000,000.00) from funds transferred to the Commission under 89-117/80010 Atomic Energy, Executive (Allotment to Atomic Energy Commission) 1947-48. Advance and partial payments will be made to you upon your application, subject to Article VIII of said proposed Contract No. W-42-069-eng-16.

2. Your performance of the work shall be governed by the terms and conditions of the said proposed Contract No. W-42-069-eng-16 to the extent that they are not inconsistent with this Letter of Intent. By reference, the provisions of the said proposed contract are incorporated in and made a part of this Letter of Intent.
3. Neither this Letter of Intent nor any interest herein or claim hereunder shall be assigned or transferred.
4. This letter of Intent may be terminated in whole or in part by the government for its convenience at any time. On such termination, you will be reimbursed for such costs as may have been incurred by you in the performance hereunder, and for costs of termination in accordance with Article XVII of said proposed Contract No. W-42-069-eng-16, in an aggregate amount not exceeding the sum of two million dollars (\$2,000,000.00).
5. In the event a definitive contract, superseding this Letter of Intent, is not executed by 31 March 1947, or on a subsequent date mutually agreed upon this Letter of Intent will terminate on 31 March 1947, or on any such subsequent date.
6. This agreement shall be effective as of 1 January 1947.

If the foregoing is acceptable to you, please indicate your acceptance by signing below and on the accompanying two copies. One copy may be retained by you for your files.

This instrument is executed under the authority vested in the Commission by the Atomic Energy Act of 1946 and Executive Order No. 9816, dated 31 December 1946.

Very truly yours,

THE UNITED STATES OF AMERICA

By /s/E. E. Kirkpatrick

E. E. Kirkpatrick
Colonel, Corps of Engineers
Contracting Officer

Accepted this 14th day of

January _____ 1947.

ASSOCIATED UNIVERSITIES, INC.

By /s/ Edward Reynolds
President