UNITED STATES ATOMIC ENERGY COMMISSION

Twelfth Semiannual Report

OF THE

ATOMIC ENERGY COMMISSION

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LETTER OF SUBMITTAL

WASHINGTON, D. C.
31 July 1952

SIRS: We have the honor to submit herewith the Twelfth Semi-annual Report of the United States Atomic Energy Commission, as required by the Atomic Energy Act of 1946.

Respectfully,

UNITED STATES ATOMIC ENERGY COMMISSION,
T. KEITH GLENNAN,
THOMAS E. MURRAY,
H. D. SMYTH,
EUGENE M. ZUCKERT,
GORDON DEAN, *Chairman.*

The Honorable
The President of the Senate.

The Honorable
The Speaker of the House of Representatives.

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MAJOR ACTIVITIES IN ATOMIC ENERGY PROGRAMS, JANUARY–JUNE 1952

This Twelfth Semiannual Report of the United States Atomic Energy Commission covers those major developments of the period January to June 1952 in the atomic energy program which, under the requirements of national security, may be publicly reported.

While the schedules of production from existing facilities, and of research and development work under current contracts were maintained, the building of new facilities accelerated until by mid-year almost 3 percent of the Nation's construction labor force was at work on atomic energy construction projects.

The Congress, in the supplemental appropriation act signed by the President on July 15, approved a further expansion of atomic energy production capacity which would eventually add 3.5 billion dollars to the Nation's investment in atomic energy plants.

Development of reactors, the machines which release nuclear energy at controlled rates, was carried forward. Details are recounted in a later chapter. Specific items of progress in research in the physical, biological, and medical sciences are related in the chapters dealing with these subjects. The Commission in this connection wishes to emphasize once again the important fact that only this fundamental research can provide the foundation on which the nuclear technology of the future for all purposes may be firmly based. Without continued growth and success in this field, we cannot look for the greatest possible results from atomic energy development in all its phases.

Although, for reasons of security, it is impossible here to specify the record of accomplishment in weapons development, it may be stated that substantial progress was made. The major factor which came to public attention was the series of tests of nuclear devices leading to weapons development which took place in April, May, and June at the Nevada Proving Ground. For the first time, a test detonation—one of this series—was witnessed, under conditions safeguarding security of restricted data, by representatives of State, Federal, and Territorial civil defense agencies, press, radio, motion pictures, and was transmitted by television.

The report deals also with the salient developments in the first basic aspect of the program—provision of the necessary supplies of raw materials. It sums up the advance of the construction program, points out the types of problems encountered in community affairs at the major sites and the solutions reached, and reports actions taken in

the fields of new legislation, finance, patents, labor management relations, safety and fire protection, security operations, and information issuance.

On February 25, 1952, Eugene M. Zuckert was appointed a Commissioner in place of Sumner T. Pike, who had resigned in December 1951. Just prior to his appointment as a member of the Commission, Mr. Zuckert had served as Assistant Secretary of the U. S. Air Force.

The President's renomination of Thomas E. Murray, of New York, as a member of the Commission for a term of 5 years expiring June 20, 1957, was confirmed by the Senate.

The progress of power reactor development and of studies by industrial teams on possible combinations of plutonium and power production, along with the mounting impact of atomic energy progress upon the industrial community of the Nation led to the establishment of an Office of Industrial Development. Dr. William Lee Davidson, director of physical research for the B. F. Goodrich Co., was appointed to head this office. This office, on the immediate staff of the General Manager, maintains a positive, continuous link-up between American industry, large and small, and the atomic energy program for purposes of the widest possible participation of industry in the program, and the widest possible service of the atomic energy program to industry.

In the AEC staff, Thomas F. Farrell, resigned as Assistant General Manager for Manufacturing. Lindsley H. Noble, resigned as Controller effective May 11. Francis J. McCarthy, formerly Assistant Controller for Budgets was named Acting Controller. The Commission appointed Oscar S. Smith, Director of the Division of Organization and Personnel to succeed Fletcher C. Waller, who resigned, effective June 13. James L. Kelehan, previously Assistant Director of the Production Division, was appointed Assistant to the Deputy General Manager.

Raw Materials

Receipts of uranium concentrates by the AEC from all sources during the first 6 months of 1952 were according to schedule. Domestic production is increasing and new sources, both foreign and domestic, are nearly ready for initial production. Domestic ore processing capacity was increased and additional production areas are being investigated. Research and development activities in all phases of the exploration for and processing of raw materials were accelerated and expanded.

Domestic Production

Several of the existing ore processing plants on the Colorado Plateau enlarged their facilities during the first half of 1952 and

further expansion is planned. The new ore-buying station at Shiprock, N. Mex., operated by American Smelting and Refining Co., is providing a convenient market for the ores produced in the Lukachukai area. A processing plant to treat these ores is now contemplated at Shiprock. Metallurgical research on these ores was done at the Watertown, Mass., laboratory, operated by the American Cyanamid Co., for the Commission and by the Bureau of Mines at Salt Lake City. At Grants, N. Mex., the Anaconda Copper Mining Co. is constructing an ore-buying depot, sampling plant, and processing mill to treat the ores produced in that area. Temporary ore-buying facilities have been set up to provide a market for ore while the mill is under construction.

The site for an ore-buying station at Greenriver, Utah, has been selected, and construction of the depot is scheduled to begin in this year. This will provide a market for ores produced in the Temple Mountain district and surrounding area west of the Colorado River. An ore-buying station in the Black Hills region of South Dakota, probably near Edgmont, is planned. The American Cyanamid Co., will operate this station for the Commission. This will provide impetus for the early development of this new uranium area.

Assistance was given uranium ore producers of the Colorado Plateau in opening up new uranium producing districts. Under the Federal Aid Highway Act of 1950, construction of 783 miles of access roads costing nearly $4,200,000 has been started and additional projects are planned. Other assistance, such as bonus payments for initial production, has provided substantial incentives. Over $600,000 has been paid since this bonus was announced early in 1951. More than 450 uranium mining properties have been certified for these payments.

Construction of the first plant for the recovery of uranium from phosphoric acid is nearing completion by the Blockson Chemical Co., Joliet, Ill., and initial production of uranium is expected this year. Pilot plant studies are under way at other locations to develop suitable processes for additional uranium recovery plants.

Foreign Production

Uranium deliveries to the United States Atomic Energy Commission from foreign sources during the first half of 1952 were on schedule. In Canada, the additional mill facilities, which have been under construction at the Eldorado mine on Great Bear Lake, are now in operation. The first of several plants being constructed in South Africa to recover uranium from the gold ores of the Rand is nearly ready to start production. An agreement was reached with Australia to supply uranium to the United States.

Domestic Exploration

The domestic exploration program continues to be largely concentrated in the Colorado Plateau area where the AEC and the United States Geological Survey, under AEC sponsorship, have extensive programs under way. This area continues to be the most favorable geologically for the occurrence of uranium in the United States. The intensive exploration has resulted in an extension of the uranium-producing areas of the Colorado Plateau into surrounding, previously unproductive areas—primarily the Navajo Indian Reservation of Arizona and the Grants, N. Mex., area.

In addition to the Colorado Plateau, broad reconnaissance has revealed several regions which offer possibilities as production areas. In the Black Hills of South Dakota, occurrences of uranium ore are receiving further detailed investigation by the AEC. A number of private companies are also actively exploring this area.

The Commission supports geological and mineralogical studies at a number of private institutions (see Appendix 5).

Drilling

More than 1,000,000 feet of AEC sponsored drilling was accomplished during the year ending June 30, 1952. Approximately 1,500,000 feet of drilling is planned for fiscal year 1953. Private mining interests also are increasing their drilling programs. Loans totaling over $475,000 were approved in the past 6 months by the Defense Minerals Exploration Administration for exploration and development at 14 uranium mines in the West. Much of the exploration work under these loans is being done underground and consists of drifting, crosscutting, raising, and diamond drilling from underground stations.

An improved drill hole logging device, developed by the New York Operations Office, provides a faster and more accurate means of obtaining data on the radioactivity in drill holes. The instrument uses a scintillation counter, and can distinguish between gamma rays of varying energies. In this kind of work the new device is superior to those using Geiger-Mueller tubes.

Airborne Exploration

Scintillation-type detectors have also been developed for use in airborne radioactivity surveying. The applicable phases of the aeromagnetic surveying technique have been combined with certain other

refinements in methods and equipment to develop a new technique of airborne radioactivity surveying. During the year ending June 30, about 22,500 miles of reconnaissance flying was done on the Colorado Plateau, and for the 1953 fiscal year approximately 50,000 miles of flying are planned. About one-third of this will be carried on simultaneously with aeromagnetic surveying from the same aircraft. Indications of radioactivity found by this technique will then be checked by field parties.

New Exploration Offices

To increase the effectiveness of the expanding domestic uranium exploration program, a new AEC exploration branch office was established at Salt Lake City. The Spokane Exploration Branch Office was discontinued. Suboffices under the jurisdiction of the Salt Lake City, Denver and Grand Junction, Colo., exploration branch offices were established at Butte, Mont.; Richfield, Utah; Hot Springs, S. Dak., and Grants, N. Mex.

Research and Process Development

Important to the success of the Commission's raw materials program is the research under way to develop and improve uranium recovery processes. The AEC has given technical assistance to domestic and foreign ore processors in developing new and improved methods of recovering uranium, and sponsors basic research on the chemical and physical properties of uranium ores. These studies are becoming more important as emphasis is placed on domestic low-grade sources of uranium and on the development of additional foreign sources.

Much of this work is carried on by industrial concerns and by the Bureau of Mines, under contract to the AEC. A significant portion of the work has centered at the AEC raw materials development laboratory now located at the Watertown, Mass., Arsenal. A new building to house this laboratory at Winchester, Mass., is scheduled for completion in the fall.

Production

By placing new units in operation as soon as they are completed and by operating all plants at design capacity rates or higher, an increasing quantity of fissionable materials has been produced during the last 6 months.

Expansion

On July 15, 1952, the President signed an act appropriating funds for an expansion of the atomic energy program. A considerable portion of these funds will be used for the construction of additional fissionable materials production facilities. To achieve the increased production goal for uranium 235, approved by the President earlier this year, additional gaseous diffusion plant capacity is scheduled to be added at the existing Oak Ridge, Tenn., and Paducah, Ky., plants and a plant at a new site is planned. Provision also is made for necessary supporting facilities at each of these sites.

A major item for each of the three sites is electric power generating and transmission capacity. The annual power consumption of the plant at the new site, for example, will be more than the 1951 consumption of New York City. These demands for electric power are of such magnitude that additional steam generating plants will have to be constructed. Separate proposals to provide electric power at one or more of the three sites for additional uranium 235 production capacity have been received from various combinations of private utility companies and from the Tennessee Valley Authority. The Commission has authorized negotiations with Electric Energy, Inc., for one-fourth of the Paducah expansion demand, with the Tennessee Valley Authority for three-fourths of the Paducah requirements and for the entire Oak Ridge expansion needs, and with private utility firms for the power requirements at the proposed new site.

The expansion in the production of plutonium is proposed to be accomplished by the construction of additional reactors at Hanford and Savannah River together with necessary supporting facilities and utilities at each plant.

Construction Progress

The construction status of major production facilities at the end of the first 6 months of 1952 was as follows:

Feed Materials Production Center at Fernald, Ohio, was partially complete and about 500 employees of the National Lead Co., operating contractor for the center, were already working at the site.

Paducah gaseous diffusion plant construction progress indicates that the first units will be completed later than originally scheduled, but the last units will be ready for operation by the dates originally set.

Savannah River Plant construction progress as of June 30, could be gauged by the following: Acquisition of more than 97 percent of the

tracts was completed—representing over 96 percent of the total land to be acquired. Of the estimated 30,000,000 cubic yards of earth to be excavated, two-thirds had been moved; one-half million cubic yards of concrete had been poured; and 10,000 tons of structural steel had been erected.

Reactor Location Problems

To assist and advise the Commission in determining the criteria to be used in the location of atomic energy plants, an Industrial Committee on Reactor Location Problems was established some months ago (see Appendix 2 for membership). The committee will balance the technical and scientific aspects of reactor hazards as determined by the Reactor Safeguard Committee against nontechnical aspects giving consideration to such matters as the social and economic impact on adjacent communities of large-scale Government acquisition of land.

This committee's first assignments have included a review of all phases of the problem at Hanford, Wash., connected with retaining the Wahluke Slope under Government control. The group has met with the contractors and AEC technical people involved in the operation of the Hanford, Brookhaven, and Savannah River reactors; with members of the Reactor Safeguard Committee; and with various groups interested in the release of the Wahluke Slope for agricultural purposes. The committee's considerations included the additional potential hazard that will result from the construction of new production facilities at Hanford under the recently authorized expansion program. A report containing the recommendations of this committee with respect to the Wahluke Slope is to be submitted to the Commission.

Housing And Community Facilities At New Plants

As of June 30, 1952, 37,100 persons were employed at the Savannah River project and 24,000 at the Paducah plant. Of these totals, about 72 percent at Savannah River and 49 percent at Paducah were in-migrant to the areas. The housing of these in-migrant workers has been a major concern of the Commission.

Housing

The Housing and Home Finance Agency has programmed an additional 300 permanent dwelling units bringing to 3,900 the number of units to be constructed by private industry in the Savannah River area under this program. Of these, 200 are being reserved for mili-

tary personnel at nearby Camp Gordon in Georgia. By June 30 over 2,500 of these units had been started and 800 completed.

Construction of 4,500 privately financed temporary dormitory housing accommodations for construction workers at Savannah River was completed by Lyles and Lang Construction Co. of Columbia, S. C. As of June 30, 958 of these dormitory accommodations were occupied. Plans to construct an additional 3,000 units as originally programmed were canceled. Of the 4,000 trailer accommodations for families, being constructed and operated by the John A. Robbins Co., 2,328 were completed and occupied on June 30, 1952.

At Paducah, 500 dormitory accommodations have been constructed by F. H. McGraw & Co. and 277 temporary units for families of construction supervisors have been provided under a contract with the Forrest Harmon Co., Inc. The AEC has authorized McGraw & Co. to build an additional 300 dormitory spaces and is studying the need for and the method by which additional temporary family type units should be provided to accommodate the increase in the number of construction workers which has reached a peak of 22,600.

To provide permanent dwelling units for Paducah plant operating personnel, Forest Hills, Inc., has been selected as sponsor to provide 500 privately financed and operated rental housing units under the provisions of title VIII of the National Housing Act. Although the site for this housing project was annexed by the city of Paducah during June, negotiations are still under way concerning certain requirements imposed on the sponsor by the city of Paducah.

Schools and Community Facilities

A temporary 15-classroom school at Jackson, S. C., financed with Federal funds through the Federal Security Administration, was completed in time to permit the transfer of the children from the Ellenton School on March 1. On that day the town of Ellenton was taken over by the AEC and all the residents had been or were being moved out. Construction of the remaining 172 temporary classrooms scheduled for communities in the Savannah River area is proceeding and most of them are expected to be ready for the school term beginning in September 1952.

While no serious consequence to the AEC program has occurred to date from a deficiency of community facilities and services in the Savannah River and Paducah areas, the AEC is concerned and has been discussing with the Housing and Home Finance Agency and the Federal Security Agency whether or not Federal assistance for recreation and hospital facilities will be provided in time to meet the emergency in-migration of workers.

An agreement was reached with the Lyles and Lang Co., to provide at each dormitory camp a softball field; horseshoe pits; use of service building (cafeteria room) for reading, games, and other activities for which the room might be suitable; and two game rooms, 12 by 30 feet, in the dormitory buildings. Discussions are still in progress with the Robbins Co., regarding recreational facilities at the trailer sites. In addition, the Commission approved a recommendation of the du Pont Co., that three temporary recreational park areas be provided at the Savannah River site for employees and their families.

Community Operations

Several definite steps have been taken to determine the possibility and desirability of disposing of the communities of Oak Ridge, Richland, and Los Alamos, N. Mex., as recommended by the Panel on Community Operations.

Incorporation and Private Ownership

Private appraisal firms completed their appraisals of single and double family houses and improved vacant lots at both Oak Ridge and Richland. These appraisals, together with terms of financing the purchase of homes as recommended by the panel, were furnished to the present occupants and published for the information of the community. Upon recommendation of the Bureau of the Budget, the Bureau of the Census was retained to make an opinion survey at both communities to obtain the reaction of the residents to the recommendations of the panel.

Questionnaires were distributed by the Bureau of the Census at Oak Ridge on March 27 and 28 and at Richland on May 2. Preliminary tabulations have been made of the answers to the questionnaires of both surveys. These preliminary tabulations were published in Oak Ridge and Richland as soon as they were received from the Bureau of the Census. The final reports on the results of the followup interviews at both Oak Ridge and Richland were received early in July. The reaction of the residents is being studied in conjunction with the recommendations of the panel as related to AEC operations at Richland and Oak Ridge.

Rent control. All housing accommodations at Richland and the housing at Oak Ridge constructed before February 1, 1947, are subject to Federal rent control. The maximum rents which may ultimately be established by the Office of Rent Stabilization may preclude, during

the period rent control is effective, the adjustment of rents to levels previously planned on the basis of independent appraisals and, in consequence, prevent the reduction of net AEC costs to the levels planned. The AEC is continuing discussions with the ORS to determine what rent increases may be effected at Oak Ridge and Richland.

Bauer-Day, Inc., of Portland, Oreg., was selected to build and operate 500 privately owned rental housing units at Richland under the provisions of title VIII of the National Housing Act as amended. The housing will be located on Government-owned land which has been leased to the sponsor. The FHA has insured the mortgage and construction of the housing project is expected to start in July 1952.

At its request, the General Electric Co. was released from its responsibility for managing the North Richland construction camp. On a competitive bid basis, a unit cost contract was awarded to the Universal Food Service, Inc., for managing and servicing of this housing. This change was effective April 1, 1952.

Los Alamos Community

The Commission approved recommendations by the Panel on Community Operations for Los Alamos including a finding that incorporation and home ownership were not possible at this time, but should be kept under review. The panel stated that isolation of the community and its complete dependence on a single industry, the type of real estate and the requirement for security do not make incorporation and private ownership feasible now. The panel reported the town of Los Alamos was being effectively operated at present.

Construction and Supply

Excluding the expansion program approved by Congress and the President in July, the cost of the AEC construction program to be undertaken from Jan. 1, 1952, to completion, is approximately 2.6 billion dollars. Costs incurred for plant and equipment on AEC construction projects increased from about 99 million dollars during January 1952 to about 104 million dollars during May. Monthly construction costs incurred during the first 5 months of 1952 averaged about 100 million dollars. They are expected to reach a peak of 128 million dollars in September 1952 and will then amount to about 5 percent of the total monthly costs for all United States construction.

Average AEC construction contractor employment increased during the first 5 months of 1952 from about 60,000 in January to about 72,000 in May. At its peak, excluding the expansion program, the AEC total will represent about 3 percent of the total national contract construction employment.

Priorities

AEC continues to function under the national priorities system and has participated in the development of priority devices provided by the National Production Authority which afford special preferential treatment to orders for materials and equipment required for the military and AEC construction and operations programs.

The tight schedules governing AEC construction, however, still present delivery problems in critical materials and equipment, notably steel, electrical equipment, and machine tools. Both the Defense Production Administration and NPA have continued to work closely with the AEC to solve these problems and to assure full benefit to the Commission of the priority powers available within their authority. Specific measures taken by these agencies to assist AEC programs include:

a) The establishing at the Wilmington Area Office of a special NPA field expediting unit authorized to give spot assistance to Savannah River orders requiring special expediting action.

b) The appointment by the administrators of DPA and NPA of a joint Assistant Administrator for atomic energy programs.

V-Loan Guarantees

While the volume of applications to AEC by lending banks for guarantees of V-loans for working capital to defense contractors has been comparatively small, the contracts for which this type of financing is required are highly essential and in most cases involve the production of specialty items. V-loans have been useful in assisting the AEC program, particularly in increasing small business participation. As of June 30, 1952, AEC had authorized guarantees of 6 loans amounting to 29 million dollars.

Small Business Participation

The procurement policies of AEC and those established by the Commission for its cost-type contractors require that a fair proportion of the total supplies and services shall be procured from small business firms. Each AEC Operations Office has a specialist who develops a program designed to best meet the needs of that office with special consideration for local small business.

From July 1, 1950 to April 30, 1952, AEC contract awards amounted to approximately 1.9 billion dollars. Of this amount 78 million dollars,

or 4 percent of the total, was placed directly with small business firms. Because AEC construction programs and operations of major facilities are carried out by cost-type contractors, the results of the AEC small-business program are primarily reflected by the subcontracts placed with small-business firms. These subcontract figures (see table) show that during the period July 1, 1950 to April 30, 1952, AEC subcontract awards made by all cost-type contractors amounted to 1.4 billion dollars. Of this amount 416 million dollars, or 30 percent of the total, was awarded to small-business firms.

SUBCONTRACT AWARDS BY COST-REIMBURSEMENT CONTRACTORS
July 1, 1950 to Apr. 30, 1952

	Under $500,000		Over $500,000		Total	
	Million dollars	Percent of total	Million dollars	Percent of total	Million dollars	Percent of total
Small business	$319.6	45.2	$96.4	14.6	$415.9	30.4
Larger business	384.0	54.3	564.0	85.1	948.0	69.2
Educational institutions and other	3.4	0.5	2.0	0.3	5.4	0.4
	$707.0	100.0	$662.4	100.0	$1,369.3	100.4

Communications. Installation of telephone, teletype, and mobile radio-telephone facilities at the Las Vegas Field Office was completed. This extensive telecommunications system, utilizing all the presently known electronic media for the exchange of information, supports the Atomic Energy Commission's nuclear test activities at the Nevada Proving Ground.

New Branches. In January a Procurement and Contracts Branch was established to coordinate AEC policy and procedures in these fields. An Engineering Branch was formed late in 1951 to review budgetary and preliminary estimates for construction and develop criteria for the engineering design for AEC projects. The first 11 chapters of these design criteria have been issued.

Military Application

A large part of the total national effort in the atomic energy field continued to be directed to the military aspects of atomic energy. Production of atomic weapons proceeded steadily. Research in a

variety of subjects continued to yield new developments applicable to weapons; work continued on the application of these improvements to the design of specific weapon models to meet the various needs of the Armed Forces. Construction of several new facilities for weapons work progressed satisfactorily.

Another series of nuclear detonations for test purposes was conducted at the Nevada Proving Ground in April, May, and June 1952. Such tests are a fundamental part of the weapons development program and are essential to advancement in this phase of the work, both to improve weapon design and performance, and to increase knowledge of the effects of atomic explosions. The Commission made arrangements for one of the detonations in April to be observed by Federal, State, and Territorial civil defense officials and representatives of the press, radio, newsreel, and television services from a point within the bounds of the Nevada reservation (see p. 44).

The Department of Defense and the Atomic Energy Commission worked together closely in conducting the spring tests. The Commission through its contractors was responsible for the test devices, and both the Commission and the Department of Defense participated in the scientific measurements. In addition, the Department of Defense performed many essential supporting functions.

The Armed Forces took advantage of several detonations in this series for additional indoctrination of personnel in the effects of atomic explosions, for simulated combat maneuvers, and to continue various studies in which they have an interest.

Additional tests will be held at the Nevada and Eniwetok Proving Grounds as required. Presidential approval is obtained for all such tests. Joint Task Force 132, composed of personnel of the AEC, Army, Navy, and Air Force, is responsible for carrying out a future series of tests at Eniwetok.

It is not possible to describe publicly the advances made in the atomic weapons program, but details of the work are enumerated currently in classified reports to the Joint Committee on Atomic Energy of the Congress.

Reactor Development

Significant advances toward improved reactors were made during the period of this report following in train with the rapid development of reactor technology over the past several years.

New Research and Testing Reactors

The most powerful research reactor for testing possible materials for reactors of new design was completed. Two smaller reactors, first announced during the past spring, are giving valuable service, and two

more are under construction. One of the reactors being built is the first in the Nation not owned by the Federal Government.

Materials Testing Reactor

Construction of the Materials Testing Reactor was completed at the National Reactor Testing Station in Idaho early in 1952. Tests followed; the reactor became critical on March 31 and in May was operated at full power. During the summer this reactor's superior facilities will go into service to make irradiation tests on materials considered promising for new reactors.

A policy board representing several AEC divisions guides the use of the reactor. Detailed scheduling of tests is by Phillips Petroleum Co., operating contractor, under supervision of AEC's Idaho Operations Office.

The major construction contractor for the Materials Testing Reactor was the Fluor Corp., of Los Angeles. Final design was developed by the Oak Ridge and Argonne National Laboratories, and drawings and specifications were prepared by Blaw-Knox Construction Co., of Pittsburgh, Pa. The Oak Ridge Laboratory is operated for the Commission by Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corp. Operation of Argonne Laboratory is by the University of Chicago. Research, development, and preliminary design by the two laboratories cost about 13 million dollars, and the actual building of the reactor cost an additional 18 million dollars.

Low Intensity Test Reactor

The first public information regarding the Low Intensity Test Reactor at the Oak Ridge National Laboratory was released by the Commission during the spring. LITR, as the reactor is designated, was adapted from the mechanical and nuclear mock-up that aided the design of the Materials Testing Reactor and the training of MTR operators. The modification was accomplished by increasing power, by adding research facilities and concrete block shielding, and by enclosing both reactor and facilities in a temporary building. LITR has been in operation since the fall of 1951. It is not intended to be a permanent installation.

"Swimming Pool" Reactor

Information about another low power research reactor at the Oak Ridge Laboratory was also released during the first half of 1952. This reactor went into operation early in 1951. It is the central fea-

ture of the Bulk Shield Test Facility, which is used for experiments to aid development of improved radiation shields. The facility is generally referred to as "swimming pool," since a pool of water 20 feet wide, 20 feet deep, and 40 feet long constitutes a 130,000-gallon liquid shield in which the reactor can be moved about and radiation measurements made at any point.

Chicago Pile No. 5

Construction of a building for a new research reactor, CP–5 (for Chicago Pile No. 5), at the Argonne National Laboratory was brought to 85 percent completion by the end of June. CP–5, located at the Laboratory's permanent DuPage County site, will replace CP–3 Prime, which is at the temporary forest preserve site. Operation is scheduled to begin early in 1953. The reactor and building are estimated to cost about 2 million dollars.

Raleigh Research Reactor

At the end of June the concrete shielding had been poured and the building was being constructed for the first non-AEC reactor, known as Raleigh Research Reactor, which is being built by the Consolidated Universities of North Carolina on the campus of North Carolina State College at Raleigh. The total cost of about $500,000 for the reactor, auxiliary equipment, and building with "hot" laboratories and classrooms is being met by the University with the help of a grant from the Burlington Mills Foundation.

The reactor is of the homogeneous type generally similar to the Water Boiler Reactor at Los Alamos Scientific Laboratory. It will have a maximum power of 10 kilowatts. The Universities are negotiating with the AEC for loan of uranium 235 for use as fuel. The loading of the reactor with fuel is expected to begin in late 1952 or early 1953.

Low Power Research Reactor Designs

North American Aviation, Inc., of Downey, Calif., completed work on a design for a low power research reactor for unclassified use by non-AEC organizations. The design calls for a graphite-moderated reactor with solid, partly enriched uranium fuel and a power of 160 kilowatts.

The Oak Ridge Laboratory suggested that the "Swimming Pool" type reactor might be adapted for a low cost general research reactor.

A third design available is for a small homogeneous reactor, like the Los Alamos Water Boiler and the Raleigh Research Reactor.

These reactors would vary in cost, power, neutron flux, and space available for specimens to be irradiated, and hence each would serve somewhat different purposes.

Military Propulsion Reactors

The keel was laid for the first nuclear powered submarine, and construction began on a land-based prototype for a submarine nuclear power plant of different design from that of the first nuclear underwater vessel. Progress was made in the development of nuclear propulsion for aircraft.

Submarine Thermal Reactor

The keel plate for the first nuclear powered submarine, the USS *Nautilus*, in which the second version of the Submarine Thermal Reactor and power plant will be installed, was laid at Groton, Conn., on June 14 in ceremonies at which the President of the United States delivered an address.

Work continued at the National Reactor Testing Station on construction of the prototype reactor. This reactor power plant is being assembled in a section of a submarine hull where it will be given thorough tests.

Westinghouse Electric Corp., the prime contractor, is developing the STR plants jointly with Argonne National Laboratory and has the assistance of many industrial subcontractors. The Electric Boat Division of General Dynamics Corp., Groton, Conn., is building the submarine hull for the Navy; Westinghouse also will furnish propulsion machinery.

Submarine Intermediate Reactor

Construction of a land-based prototype of the Submarine Intermediate Reactor and its power plant was started by the General Electric Co., following Commission authorization in February. This prototype is being built at the AEC-owned, partly developed, 4,000-acre site at West Milton, N. Y., about 18 miles north of Schenectady.

The reactor and other equipment handling liquid metal coolant will be housed in a spherical steel building 225 feet in diameter, similar to structures widely used in the petroleum and chemical industries. This type of building will provide protection in addition to the many safety controls of the reactor itself. Work is in progress on the building's foundations.

Aircraft Nuclear Propulsion

Design and development work by the Aircraft Gas Turbine Department of General Electric Co. toward aircraft propulsion by nuclear power gained momentum during the last 6 months. Most of the General Electric staff at Oak Ridge, Tenn., moved to the GE plant at Lockland, Ohio, where work on this project is centered.

Oak Ridge National Laboratory continued investigations into various aspects of aircraft nuclear propulsion. The AEC is negotiating with the Pratt and Whitney Division of United Aircraft Corp., East Hartford, Conn., for reactor study and experimentation.

Fluidized Program and Breeding Investigations

Among the lines of investigation being pursued in reactor development are two employing reactors of pilot size. One of these reactors went into operation during this period.

Homogeneous Reactor Experiment

The Homogeneous Reactor Experiment, a pilot reactor constituting a step in examination of fluidized reactor possibilities, was completed at the Oak Ridge National Laboratory. This reactor reached criticality on April 15. Its power is being increased slowly as the behavior of the reactor system and the materials are observed concurrently with experimentation. A small experimental plant to produce electric power is a part of the installation.

Experimental Breeder Reactor

Following operation last December at the National Reactor Testing Station of the Experimental Breeder Reactor to demonstrate in a small way production of electric power, this new reactor during the past 6 months began a test program aimed at acquiring information on the possibility of breeding. Successful breeding, which means production of more nuclear fuel than is consumed, would increase many times the fissionable material available for use as reactor fuel or for other purposes.

Chemical Processing Plant

A new processing plant to recover uranium from irradiated fuel components of reactors is nearing completion at the Testing Station. Its estimated cost is 34 million dollars. The detailed engineering design was prepared by Foster Wheeler Corp., of New York City, under the direction of Oak Ridge National Laboratory. Bechtel Corp., of

San Francisco, is the major construction contractor. The plant will be operated by American Cyanamid Co., of New York City.

Wider Industrial Participation

The first series of industrial surveys of reactor technology by firms interested in the possibility of getting into the reactor business was completed, and the AEC entered a joint program of research and development with two of the firms. A second series of surveys is being negotiated. Following AEC-sponsored development of processing, the Commission arranged to buy zirconium and hafnium metal on a unit price basis from a private producer.

Surveys of Reactor Technology

Final reports were received from the four industrial groups[1] that have been surveying reactor technology in search of ways for industrial firms to have a larger share in developing, building, and operating reactors and nuclear power plants.

In April the Commission issued a public invitation to business organizations interested in taking part in a second series of surveys. Discussions are in progress with a number of companies that expressed interest.

The Dow Chemical and Detroit Edison Companies were the first pair to submit a report on last year's surveys. The Dow-Detroit Edison report proposed jointly financed research and development regarding the feasibility of a particular type of dual-purpose reactor for producing both fissionable material and electric power. The Commission accepted the substance of this proposal in April; details of a letter of agreement are being negotiated. The reports of the other groups were received in May and June and are being studied.

The investigations proposed by Dow-Detroit Edison are in keeping with the AEC's long-range reactor program and will intensify the approach to improved reactors along the lines of the design selected. Most of the work by the two companies, estimated at about $275,000 in direct costs, not including overhead, will be carried on in their own laboratories, while the AEC-sponsored research will be in national laboratories with their special facilities. Much of the Commission's supporting investigations are already in progress or have been budgeted as a part of AEC's long-range reactor development program at about $725,000 in direct costs.

[1] Monsanto Chemical Co. and its associate, Union Electric Co., both of St. Louis; Detroit Edison Co., of Detroit, and Dow Chemical Co., of Midland, Mich.; Commonwealth Edison Co. and Public Service Co., of Northern Ill., both of Chicago; and Bechtel Corp. and Pacific Gas & Electric Co., both of San Francisco.

Zirconium Unit-Price Contract

In May the Atomic Energy Commission entered a contract with Carborundum Metals Co., Inc., a subsidiary of the Carborundum Co., of Niagara Falls, N. Y., for the production of zirconium and hafnium metals in sponge form for about $15 a pound.

The Carborundum contract is a significant step in the Commission's program to encourage private enterprise, using its own capital, to take over portions of AEC work which can be handled on a conventional business basis. It is expected that production of zirconium and hafnium sponge in excess of AEC needs will be placed on the open market. Zirconium has many potential uses because of its resistance to corrosion.

Fission Product Investigations

The program to develop uses for fission products, the highly radioactive isotopes in the waste from the chemical processing of spent reactor fuel, settled down to detailed study and investigation at 10 locations.

Two new projects were started during the past 6 months. The University of Chicago received from Brookhaven a 1.5-kilocurie source for a program financed by the American Meat Institute Foundation, the Food Research Institute, the University, and the AEC to investigate the possibility of cold sterilizing meat and other food products. Rensselaer Polytechnic Institute, Troy, N. Y., using a low-level, beta-emitting source prepared in the Oak Ridge Graphite Reactor, began investigating the possibility of utilizing fission products to promote certain chemical reactions.

Sanitary and Environmental Engineering

Research, development, and investigations in sanitary engineering were advanced by AEC contractors during the first half of 1952 to obtain more efficient handling and disposal of wastes at lower cost and to secure better information on the environmental aspects of atomic energy operations.

Sewage Treatment Methods

Investigations proceeded at a number of universities to determine the feasibility of using regular domestic or industrial sewage treatment methods on high-volume, low-level radioactive wastes. If conventional equipment and methods can be used, the cost of handling such

wastes will be substantially lowered. During recent months work was started at the University of Texas to find out if the concentrating capabilities of algae can be used. Similar studies were begun at the University of Illinois with the sewage sludge digestion process. The trickling filter is being examined at New York University, and the Los Alamos Scientific Laboratory, the activated sludge process at the University of California, and other biochemical methods at Johns Hopkins University.

Preliminary results of the investigations were applied in the design of a full-scale disposal plant for treating both domestic sewage and radioactive laundry wastes. The plant, which will be of the trickling filter type, is to be constructed at the Central Facilities Area of the National Reactor Testing Station.

Ultimate Waste Disposal

Studies at Brookhaven National Laboratory demonstrated the feasibility of permanently fixing radioactivity in natural clays. Small bench-scale work was started to develop practical engineering methods for applying on a production basis this promising means of concentrating radioactivity.

Incinerator Research and Development

Pilot model work on a simple, efficient incinerator suitable for burning solid combustible wastes was completed by the Bureau of Mines, and a prototype unit with a capacity of 50 pounds per hour is being built. The final design and specifications will be turned over to commercial manufacturers. At Johns Hopkins University, experiments with a conventional institutional incinerator burning wastes containing radioactive phosphorus 32 showed that more than 90 percent of the radioactivity of the wastes went into the ash, the remaining 10 percent into stack deposits and small particles of the smoke.

Air Cleaning

Sample units of a high-temperature, acid-resistant, high-efficiency air filter developed by A. D. Little, Inc., of Cambridge, Mass., were sent to AEC installations for field test and evaluation. Successful experimental paper mill runs of a new glass fiber and asbestos filter medium were made through the cooperation of the Riegel Paper Co., Riegelsville, N. J. Special air cleaning apparatus to remove perchloric acid fumes from the discharged atmosphere of laboratories using this acid was designed and built by the Air Cleaning Laboratory of Harvard University.

At the University of Illinois, fundamental work on aerosols, which backs up advances in the field of air cleaning, was continued. A report [2] on the thermal forces on aerosols was published.

Environmental Studies

The U. S. Weather Bureau and the U. S. Geological Survey made detailed meteorologic, geologic, and hydrologic reports on possible AEC plant sites. Examination of the meteorology at Oak Ridge and the National Reactor Testing Station was completed as the basis for recommendations for continuing programs of observation, study, and application.

The Geological Survey started basic work to evaluate the factors involved in the movement, slowing down, and retention of radioactivity released into the ground. The Lovelace Foundation, at Albuquerque, N. Mex., cooperated in this work by making petrographic and mineralogic analyses of samples of earth materials at Los Alamos.

U. S. Public Health Service surveys on the Columbia and Savannah Rivers yielded data related to the release of wastes into these rivers. At Harvard University, information was obtained on the fate of radioactive materials put into water pipe lines and natural reservoirs.

Oak Ridge School of Reactor Technology

The number of experienced engineers attending the Oak Ridge School of Reactor Technology is increasing. It is expected that about 50 will be enrolled for the year beginning in September 1952 along with 30 recent college graduates. The school, with a curriculum including classified subjects, is an important source of highly trained scientists and engineers for the reactor development program.

The course which ends this summer contains 67 students—38 recent college graduates, 21 experienced engineers from industry, 4 from the Air Force, 2 from the Navy, and 2 from the AEC Chicago Operations Office.

Physical Research

For the conduct of both applied and basic research, the Atomic Energy Commission supports major research and development centers where the buildings and equipment are partially or wholly financed

[2] "Thermal Force on an Aerosol in a Temperature Gradient," R. L. Saxton and W. E. Kunz, Dec. 31, 1951. Illinois University Experiment Station. (SO–1007) 44 p. Available for reference at AEC depository libraries.

by the AEC and where appropriate costs are reimbursed to the university or industrial contractor operators (see Appendix 3). These installations carry on most of the applied and classified research. A large part of the fundamental research of the atomic energy program is carried on by individual researchers in universities, private research institutions, and industrial organizations. These projects usually are financed partially by the contracting institution and partially by the Atomic Energy Commission.

University and private laboratory contractors are continuing to give their full cooperation to a closer association of their research programs with the immediate operation and development of the atomic energy program (see Appendix 5). Fundamental research, however, continues in those fields where there appears to be reasonable eventual relevance to the release and utilization of atomic energy.

Rare Earths

Rare earth elements are so much alike chemically that it is difficult to separate them in pure form. The most successful method has been a refinement of the ion exchange process.[3] Through the studies on the separation of rare earths at Ames Laboratory, it has been possible to predict quantitatively the behavior of these materials as they undergo ion exchange treatment. The new pilot plant at Ames is now three to four times as efficient as the former ones in producing considerable quantities of rare earth salts.

Ames Laboratory scientists have also successfully produced a number of the heavy rare earths in the massive metallic state: yttrium, erbium, holmium, dysprosium, terbium, and thulium.

Quartz Spirals

The availability of long lengths of uniform quartz fibers of any desired diameter and of a newly developed quartz-spring winding machine at Mound Laboratory has led to the production of quartz spirals of very uniform quality in a wide range of fiber and coil diameters and lengths. The laboratory is operated for the Commission by Monsanto Chemical Co. Fiber diameters used for spirals range from 75 to 400 microns (0.003 to 0.016 inch), the coil diameters range from 5 to 30 millimeters (0.2 to 1.2 inches) and can be made with up to 200 turns in a 6-inch length.

[3] Seventh Semiannual Report to Congress, January 1950, Superintendent of Documents, Government Printing Office, Washington 25, D. C., 50 cents.

These helical quartz-fiber springs are useful for weight or force measurements in closed systems containing reacting atmospheres or solutions. At Mound Laboratory they are being used to make precise measurements of minute differences of weights of various radioactive solutions over wide ranges of pressure and composition.

Research Reactors

Advances were made in the past 6 months in making the research techniques developed under the auspices of the Atomic Energy Commission available to a wider group of scientists to the maximum extent consistent with the national security.

A considerable amount of reactor information has been declassified (see p. 48), and experience with the design, construction, and operation of nuclear reactors has reached a stage where reactors of low to moderate power can be safely built and operated in research, educational, medical, and industrial institutions. The utility of such reactors for research, clinical, and training purposes and the rapidly developing interest in the possibilities for atomic energy under private enterprise has led to a number of inquiries and some preliminary proposals from groups interested in constructing such reactors at their own facilities. These proposals are being studied by the Commission.

The Consolidated University of North Carolina is constructing a 10-kilowatt water-boiler type reactor on the campus of North Carolina State College. It is expected to be completed early in 1953 (see p. 15).

Particle Accelerators

During this period three accelerators financed by the AEC began operating. The 60-inch cyclotron manufactured by the Collins Radio Co. for Argonne National Laboratory was completed, assembled, and tested. Final adjustments and modifications were performed before the machine was accepted by Argonne. This machine accelerates deuterons to an energy of 22 Mev.

Cosmotron

The cosmotron at Brookhaven National Laboratory, in a peformance test on June 10, 1952, accelerated protons to 2.3 billion electron volts. This is the highest energy to which fundamental particles are known to have been accelerated by man. Continued operation at this high energy level must be continued before positive scientific results can be expected. Completion of the cosmotron makes possible the investigation of nuclear phenomena at energies ranging up to several times

those heretofore attainable in the laboratory. Testing and adjustment will continue in the expectation that proton energies up to 3 billion electron volts will be achieved in the near future.

Other New Accelerators

Brookhaven's 18-inch cyclotron is undergoing testing and tune up and it is expected to be in operation this summer. This machine is designed to accelerate protons and deuterons to approximately 3 Mev.

Proton beam currents have been accelerated to 440 Mev with the synchrocyclotron at Carnegie Institute of Technology and mesons have been successfully produced. In the University of Chicago synchrocyclotron, carbon ions have been accelerated to 1.1 Bev.

The linear accelerator at Yale University is being used for the development and operation of a high resolution neutron time-of-flight velocity selector, useful for cross section measurements.

The Maniac

Successful operation of a new electronic digital computer, designed and constructed by staff members of the Los Alamos Scientific Laboratory, was announced recently by the laboratory. The Los Alamos Scientific Laboratory is operated for the Commission by the University of California. Called the MANIAC by its creators, the new calculator is believed to have distinct advantages over many calculators of earlier design because it is more compact, simpler, and, at the same time, capable of handling more complex problems than its forerunners.

Today no one can say just why the name MANIAC was chosen, or what it meant at the time, but the machine's builders can provide some words to go with the letters and to describe the new computer: Mathematical Analyzer, Numerical Integrator And Computer. The MANIAC took 3 years to build. It is believed to be one of the smallest machines in existence capable of handling the complex problems it will be expected to solve. The machine can work 100,000 times as fast as a trained computer using a desk calculating machine.

Studies of the Nucleus

After more than 20 years of study of the atomic nucleus, science still does not fully understand the nature of nuclear forces, or, for that matter, why the nucleus holds together at all. Fundamental research continues to be essential to the long-range progress of the atomic energy industry, and a great deal more experimental work will precede a satisfactory understanding of nuclear forces.

Research is continuing at all of the national laboratories and at many universities on such properties of the nucleus as magnetic moments, beta- and gamma-ray spectra, internal conversion coefficients, and on the production and use of mesons—the particles which scientists think may hold the nucleus together.

Neutron Cross Sections

The AEC research program has concentrated its efforts to extend knowledge of neutron physics and cross sections through work at the national laboratories and through the cooperative efforts of the universities and other contractors. Bartol Research Foundation, Columbia University, Yale University, Johns Hopkins University, Rice Institute, Nuclear Development Associates, General Electric Research Laboratory, and Westinghouse Research Laboratory are contributing to this program and are receiving AEC support either directly or through the Commission's joint program with the Office of Naval Research. Facilities at Brookhaven National Laboratory and at Columbia University are being expanded and more scientists assigned to this work.

Isotope Program

Since the initiation of the isotopes distribution program in August 1946, about 27,000 shipments of radioactive isotopes have been made to 922 institutions in the United States, and more than 1900 shipments of stable isotopes have been made to 250 domestic institutions. More than 1,400 shipments of radioisotopes have been made to 34 foreign countries. During the first 5 months of 1952, Portugal received its first shipment of radioisotopes, and the Dominican Republic, El Salvador, and the Federal Republic of Germany completed diplomatic arrangements to receive United States-produced radioisotopes.

In April, the Commission released a report, "Isotopes—A Five-Year Summary of United States Distribution."[4] The report contains detailed information on all isotope investigations initiated since the program began through June 30, 1951. It includes a list of institutions and departments using radioisotopes, principal investigators, the radioisotope and purpose for which it was obtained, current status of the investigation, references to publications resulting from the work, and a table of shipments to foreign countries. It also contains a bibliography of published reports, supplementing the one which

[4] "Isotopes—A Five-Year Summary of U. S. Distribution," Superintendent of Documents, Government Printing Office, Washington 25, D. C., $1.00.

appears in "Isotopes—A Three-Year Summary of United States Distribution." [5]

Exchange of Personnel in the Isotopes Program

In February, the AEC approved the attendance by representatives of the United Kingdom and Canada at unclassified meetings of the USAEC isotope distribution committee. The three countries will benefit mutually from these meetings. The first meeting attended by representatives of the United Kingdom and Canada was that of the AEC Advisory Committee on Isotope Distribution held in Washington, March 20 and 21.

Radiolabeled Drugs, Food, and Feed

An Ad Hoc Committee of AEC, Food and Drug Administration, and National Institutes of Health officials was formed and met twice in the past 6 months to discuss problems in the increased distribution and use of radioisotopes that overlap the jurisdiction of the three agencies. The committee will serve as a clearing house on problems on the uses and proposed uses of radioisotopes in food, feed, drugs, and instruments, and, when necessary, will recommend appropriate administrative action by one or all of the agencies.

Biology and Medicine

Experimental data developed during the past 6 months have given additional strength to the AEC program of safeguarding health from radiation hazards. Illustrative of the manner in which experimental data can be put to practical use are the techniques used by the Commission's Nation-wide network of monitoring teams and fall-out collection stations to assure protection of health and property during continental weapons tests. A description is given below of the monitoring system employed which functions to detect and measure the presence of radioactivity immediately following a weapon detonation.

Progress was made in the development of research tools and techniques for the study and treatment of radiation injury and cancer. Specific new data are presented below on possible applications of radiotherapy in the treatment of cancer, the importance of radioactive substances on life processes, and the provision of training programs in specialized fields of atomic energy. Further technical assistance was

[5] "Isotopes—A Three-Year Summary of U. S. Distribution," Superintendent of Documents, Government Printing Office, Washington 25, D. C., 45 cents.

extended to the Federal Civil Defense Administration and other governmental agencies having a particular interest in civil defense.

During the fiscal year ending June 30, 1952, approximately 17.5 million dollars were allocated for biological and medical research in the national laboratories and other AEC installations; and approximately 5.8 million dollars for some 325 research contracts in universities, colleges, and private laboratories (see Appendix 5).

Weapons Test Activities

A phenomenon peculiar to atomic detonations is the fall-out of minute radioactive particles from the resulting atomic cloud. Most of the fall-out occurs within the vicinity of the target area, and to assure the safety of operating personnel, radiological safety teams have been established as an integral part of the test organization. The teams participate directly in the planning of the tests, and commence an extensive and intricate monitoring operation immediately after a weapon is detonated. Atomic weapons are not detonated unless conditions are such that radiological safety can be assured.

Some radioactive particles are picked up by wind currents and deposited throughout the country. To detect and measure these radioactive particles, an extensive network of monitoring teams and fall-out collection stations has been organized and is described in detail below. There have been no dangerous concentrations of radioactive fall-out in any part of the country outside the controlled area at the Nevada test site.

The monitoring operations were materially aided by the spirit of cooperation evidenced by Nevada and the neighboring states of Utah, California, and Arizona. In order to provide an opportunity to acquaint the responsible officials of these states with the radiological safety program, the health commissioners were invited to visit the test site, witness a test detonation, and observe first-hand the radiological safety operations.

The Nation-wide Monitoring System

The Commission's Nation-wide monitoring system has the responsibility for monitoring and measuring radioactivity throughout the Nation during test operations. Within the 200-mile area of the Nevada Proving Ground, radiation is monitored by teams of the Test Organization which report directly to the Test Director. Outside the 200-mile radius a network of fixed sample-collecting stations and mobile monitoring teams are under the direction of the Health and Safety Division of the Commission's New York Operations Office.

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The mobile monitoring teams operate generally between 200 and 500 miles from the test site, but the fall-out collecting stations are situated at selected locations throughout the Nation. With the cooperation of the United States Air Force, the United States Civil Aeronautics Authority, and the United States Weather Bureau, the monitoring activities have been expanded and the number of participating weather stations increased from 50 in 1951 to 121 in 1952.

This extensive monitoring operation, which is conducted before, during, and after a test series, has four major goals. Its primary purpose is to protect test personnel and the public by keeping a continuing and accurate check of the radiation which is dispersed in the air at the time of a nuclear detonation and is carried across the country by prevailing winds. The second important purpose is the collection of data for the evaluation of nuclear weapons effects. Thirdly, the collected data is used for the guidance of sensitive industries such as radiation instrument manufacturers, to whom even minute increases above normal background radiation might be significant. Continental tests of nuclear weapons are also providing meteorologists with a new tool for studying the movement of large masses of air at varying altitudes. A cloud even minutely radioactive can be traced across the country and its reaction to other meteorological forces thus recorded and studied. Therefore, the fourth major purpose of the monitoring program is to assist in the collection of data for the use of Weather Bureau scientists.

The background radioactivity normal to any area varies geographically as well as from hour to hour during the day. The continental tests caused a temporary average increase in radioactivity across the country of a magnitude no greater than the ordinary background radioactivity in a community like Denver, Colo., where the background radiation level is ordinarily five times greater than that of New York or Washington, D. C. In isolated instances, and for short periods of time, higher levels were measured; but in all cases the levels of radiation were far below those considered to be of public health significance. It can be stated categorically that at no time in any part of the country outside of the controlled area has radiation from continental tests been harmful to humans, animals, or crops.

Within an hour after an atomic weapon has been detonated, airborne members of the Test Organization begin to make measurements over the immediate vicinity of ground zero. Shortly thereafter monitoring teams in jeeps enter the test area to carry out a more detailed survey. A few hours later, planes are dispatched to sample and track the cloud and to survey the terrain. Some of the planes equipped with sample collecting boxes attached to the wings circle through the radioactive cloud and out as far as 600 miles to make sure that commercial airways crossed by the cloud are safe.

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The terrain survey is carried out by planes flying about 50 feet above the ground. Attached to the outside of these planes is a 6-foot long tube through which samples are drawn into an ion chamber. This instrument can differentiate between activity on the surface of the ground and that in the air at the level of the plane, thus making measurements of both possible.

Several hours after an atomic explosion, members of the six mobile teams are flown in C–47 planes provided by the United States Air Force to locations within the 200 to 500 mile radius of the test site, directly in the path predicted for the radioactive cloud. These teams are equipped with suction devices which by drawing air through a filter paper cause dust particles to be deposited on the paper. Samples are collected continuously for periods of from 20 minutes to 2 hours during the 48 hours after the explosion and are spot checked in the field with a Geiger counter to determine general radiation levels in the area.

The filter papers are then flown to the Commission's New York Operations Office laboratory for more specific measuring and analysis. Automatic counting apparatus, designed and built by the Health and Safety Division Instrument Branch, has made possible the counting of 400 to 600 samples per day since operation started March 20.

Radiation Mishap at Argonne

Although at various places in the atomic energy program workers are almost constantly in close association with great amounts of radiation, safety factors are so wide and safety measures so effective that accidental over-exposure of personnel to radiation is an extremely rare occurrence.

From the time operation of the program under the Atomic Energy Commission began in January 1947, up to June 1952 there have been only two radiation accidents. These occurred during the Eniwetok weapons tests in 1948. Four men burned their hands and a fifth man burned his leg. In each case subsequent inquiry brought out that if established safety precautions had been observed the accidents would not have occurred.

On June 2, 1952, a sudden increase of radioactivity caused a chain reaction experiment at Argonne National Laboratory to become supercritical for an instant, producing a burst of radiation which resulted in over-exposure to neutron and gamma radiation of four persons—two physicists and two technicians—working as a team upon the experiment.

During the course of their work, the team leader made a sudden change in the experimental conditions. As a result of the group

leader's action, the power being generated increased at an abnormally high rate and went to a very high level before the chain reaction was automatically stopped by special safety devices provided to cover such contingencies. The team realized that something had gone wrong and immediately ran from the shielded room in which the experiment was being carried out. In the instant that the power level was high the four employees were exposed to thermal and fast neutrons and to gamma rays.

Immediate survey of the four persons revealed no evidence of radiation contamination. Their film badges were promptly forwarded for development and examination. Medical personnel took blood samples and blood pressure measurements. Statements were taken from the team members and all were sent to a hospital. More than 3 weeks after the incident, the physiological effect upon and damage to the individuals did not appear serious and their physical condition appeared satisfactory. Measurements indicated that the two physicists received more radiation than the two technicians and this was probably less than 300 roentgens. Since the injuries were not serious, no special treatment other than rest in the hospital was indicated or undertaken. All four had returned to work by the end of June.

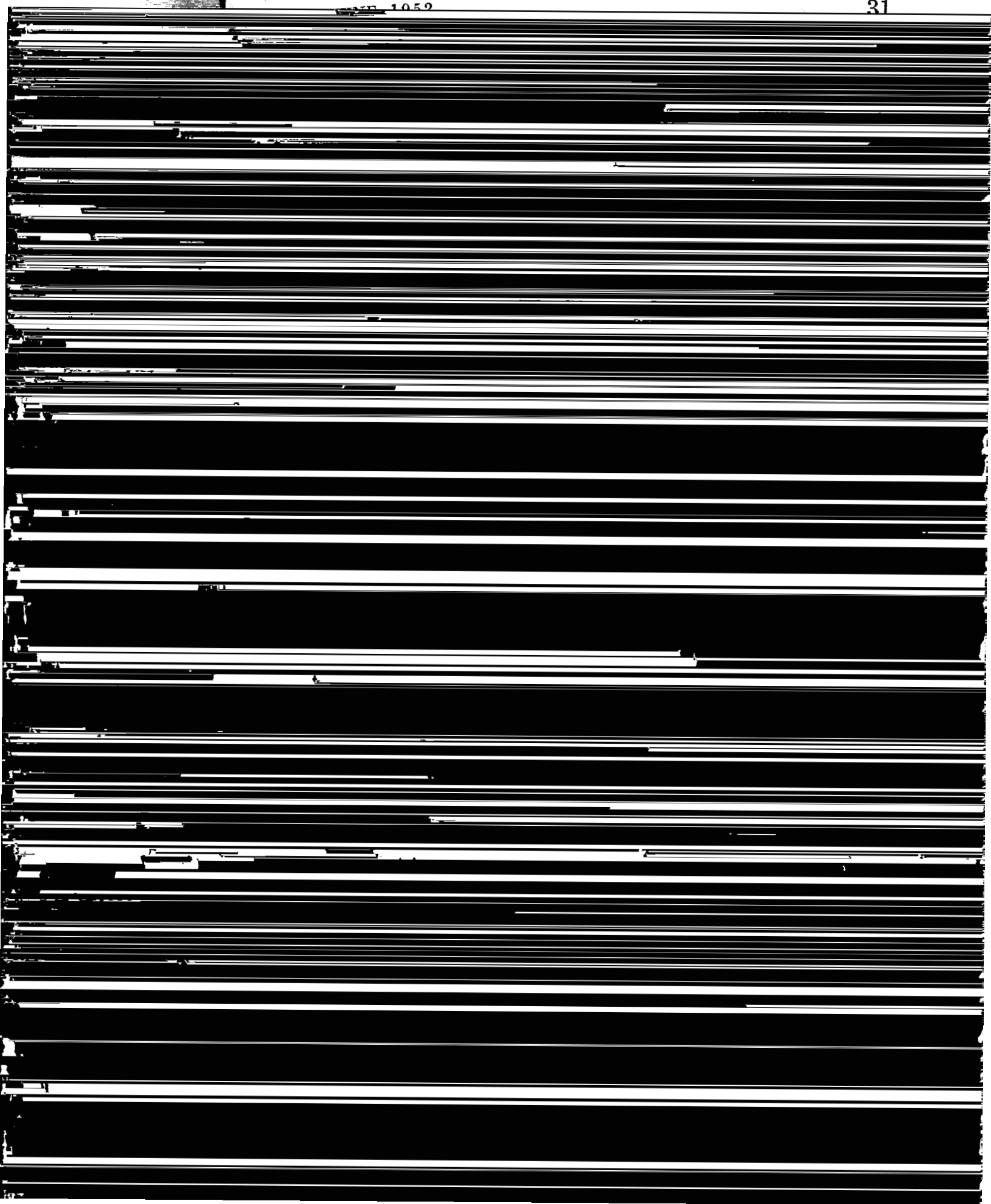
Recommendations to prevent reoccurrence of a similar incident are being studied and it is expected that additional measures will be taken to assure that established procedures and required controls cannot be bypassed.

Research Accomplishments

Radioactive Carbon (C 14)

The Commission supports research at the national laboratories and through contracts at universities and research foundations on the toxicity of radioactive carbon compounds which are used either clinically or industrially. Radioactive carbon is one of the most important biological research tools developed in the atomic energy program, but its radioactivity requires that proper precautions be taken in its use.

The evaluation of data collected over several years of research has enabled scientists to calculate recently the amounts of radioactive carbon which may be handled safely or administered to humans in experimental work. When radioactive carbon enters the body by ingestion, injection, or inhalation, it goes into the carbon pool of the body and into specific organs where it is retained for a period of time depending on the compound which enters the body. During this time the subject receives an internal radiation dose from the radioactivity of the carbon. By calculating this dosage, maximum limits have been established on the amounts of various radioactive carbon compounds



Radiation Laboratory. The laboratory's 184-inch cyclotron produces 190 Mev deuterons which travel at enormous speeds. Results indicate that the deuteron beam has unique radiological properties: straight and deep penetration in tissue with small scattering and the maximum dose near the end of the range of the beam. It appears that the deuteron beam is effective for intense irradiation of small volumes deep within the body. The particles travel so fast that they go through the skin and underlying parts of the body without doing much damage. By the time they reach the diseased tissue, they are slowed down so that their lethal work is concentrated on the deep lying target cells or tissue.

New Cancer Center

The Commission's third facility devoted to cancer research formally opened in January. This new Radiological Laboratory located at the University of California Medical Center, San Francisco, Calif., houses a 17-ton synchrotron which will be used to determine the effectiveness of powerful X-ray beams on cancer deep within the human body. The electrons produced by the machine are sent spinning through a vacuum tube at terrific velocities that approximate the speed of light. Eventually, the electrons strike a small tungsten target that produces highly penetrating X-rays which act on human tissue cells.

Experimental cancer therapy centers are now operating at Oak Ridge and Brookhaven, and the Argonne Cancer Hospital should be in full operation by the end of 1952.

Isotopes for Cancer Research

Effective July 1, the Commission began charging 20 percent of production costs for radioisotopes used in the study, diagnosis, and treatment of cancer. Since 1948, more than $1,400,000 worth of radioisotopes for these purposes have been distributed free of production costs. Users have paid only the costs of handling and transportation.

The distribution program was established to stimulate exploration of methods of using radioisotopes against cancer. Certain clinical applications of radioisotopes now have become almost a matter of routine, such as the use of radioiodine in certain types of leukemia and polycythemia vera. The usefulness of radioisotopes in cancer research, especially the use of carbon 14 to label cancer-inducing agents and to study the metabolism of cancer cells, also has become widely recognized. In view of this widespread acceptance of the use of isotopes in cancer research and therapy, it was felt that the original

objective had been largely fulfilled and that the stimulus of completely free isotopes could be withdrawn.

Radiation Effects

A biomedical research program aimed at evaluating the hazards and possible control measures for handling radioactive materials was set under way at Mound Laboratory, operated for the Commission by Monsanto Chemical Co.

To date, data have been developed on radiation dosage levels, especially the effects of small repeated doses on the animal body. One of the effects noted is the change in the phosphorus and nitrogen fractions of cells exposed to radiation. Studies are being extended to lead to better understanding of chemical treatment in counteracting, imitating, or increasing radiation effects and the metabolic processes disturbed by radiation.

Savannah River Survey

A biological survey is under way at the Savannah River site to collect data on the normal pattern of plant and animal life in the region. The data will provide a basis for future evaluations of the possible risks to living organisms should any increased radioactivity result from operations at Savannah River. The United States Public Health Service, the Academy of Natural Sciences of Philadelphia, and the Universities of Georgia and South Carolina are cooperating with the AEC in various aspects of this survey.

Low Level Portable Cobalt Irradiator

There is a definite need in the experimental radiobiology program of the Commission for a relatively inexpensive flexible source of highly penetrating gamma radiation. A pilot model semiportable cobalt irradiator to fill this need has been developed by the Brookhaven National Laboratory. The Worcester Foundation for Experimental Biology at Shrewsbury, Mass., will use the instrument to investigate the effects of radiation on the production of adrenal cortical hormones.

The model will be useful in experimental studies with small animals, can be easily handled by laboratory technicians, and its availability, ultimately, to research institutions will stimulate experimental work. The beam is effective for depth dosage and is designed to handle a moderate level source up to 250 curies [7] of cobalt 60.

[7] A curie of cobalt has about the same X-radiation effect as that from 1.5 grams of radium.

Clinical Camera

A stereoscopic camera for photographing lens and cornea of the eye has been developed under a Commission contract at Howe Laboratory of Ophthalmology at the Harvard Medical School. Various stages of radiation cataracts can be photographed and recorded making possible more accurate study of their development or regression. The camera will be particularly useful in radiation cataract investigations in Hiroshima and Nagasaki and in experimental work on radiation cataracts in animals.

Training Program

Radiological Physics Fellowships

To help fill the demand for trained health physicists, the Commission is continuing its Radiological Physics Fellowship Program. Forty-five fellows were selected in March from among more than 100 applicants for training in health physics work in Commission and other radiation laboratories during the 1952 academic year. Twenty-five fellows will study at Vanderbilt University and take field training at the Health Physics Division of the Oak Ridge National Laboratory. Twenty fellows will study at Rochester University and take field training at Brookhaven National Laboratory.

The fellowship program is administered by the Oak Ridge Institute of Nuclear Studies and selections are made by the Radiological Physics Fellowship Board. The board consists of one representative each from Rochester University, Vanderbilt University, Brookhaven National Laboratory, Oak Ridge National Laboratory, Oak Ridge Institute of Nuclear Studies, and the Oak Ridge and Washington offices of the Atomic Energy Commission.

Industrial Hygiene

A specialized training program in industrial hygiene was inaugurated by the Commission in April. The 1-year training program will start in the fall. The AEC-Industrial Hygiene Fellowship Committee has initially selected 4 candidates for academic training. The University of Rochester School of Medicine and Dentistry will administer the program as a part of the University-AEC project.

Civil Defense

The Commission has collaborated with the Federal Civil Defense Administration on the technical aspects of civil defense against

atomic weapons. Similar assistance was rendered the National Security Resources Board, General Services Administration, Department of Defense, Department of Commerce and the National Research Council. The program of cooperation includes:

a) In collaboration with the Department of Defense, the exchange of information on weapons effects data to resolve problems of shelter design, building construction, dispersal of key industrial and government facilities, radiation monitoring and training;

b) Participation of FCDA scientific and technical personnel with the AEC and Department of Defense during test operations;

c) Attendance of 62 Federal, State, and Territorial civil defense officials, including 4 governors, at one of the bomb detonations of the spring 1952 test series; and

d) Loan of radiation detection instruments and radioisotopes to State and Territorial civil defense organizations for training purposes. The radiation instruments were sent to organizations in Delaware, Illinois, Louisiana, New Jersey, New Mexico, New York, Texas, Virginia, Washington and the Territory of Hawaii. Radioisotopes were sent to organizations in Georgia, Illinois, Louisiana, New Jersey, New Mexico, New York, Texas, and Virginia.

Legislative Developments

On April 5, 1952, the President signed Public Law 298, which amends section 10 (b) (5) (B) (i) and (ii) of the Atomic Energy Act of 1946 by eliminating therefrom reference to the "Federal Bureau of Investigation" and substituting in lieu thereof the "Civil Service Commission," as the agency primarily responsible for making the investigations and reports contemplated in these provisions.

Public Law 298, the full text of which is set forth in Appendix 10, also contains a series of provisos that: (a) whenever an investigation by the Civil Service Commission develops any data reflecting that the individual who is the subject of the investigation is of questionable loyalty, the Civil Service Commission shall refer the matter to the Federal Bureau of Investigation for the conduct of a full field investigation; (b) the President may, if he deems it to be in the national interest, from time to time cause investigations of any group or class to be made by the FBI rather than the Civil Service Commission; and (c) a majority of the members of the Atomic Energy Commission shall certify those specific positions which are of a high degree of importance or sensitivity, and upon such certification the investigation and required reports shall be made by the FBI rather than the Civil Service Commission.

Personnel Security Clearances

In the Commission's Eleventh Semiannual Report to Congress various legislative proposals by the Commission for amendments to the Atomic Energy Act were discussed. One of these amendments is intended to amend the existing personnel security clearance requirements of the Atomic Energy Act to eliminate some of the inflexibility in the present requirements by authorizing the Commission to relate the scope and extent of the required investigation to the nature and significance of the access to restricted data which will be had. It would also allow the Commission to authorize its contractors to permit access to restricted data to personnel of agencies of the Department of Defense and their contractors who require the particular restricted data in the performance of their duties, on the basis of military security clearance (see p. 44).

The previous semiannual report also discussed a number of relatively minor amendments to the Atomic Energy Act proposed by the Commission to provide greater flexibility in the Commission's internal organization and to strengthen the security of the program. All of these legislative proposals have been transmitted to the Joint Committee on Atomic Energy and hearings have been held on them by the Joint Committee.

Patents

The total number of patents available to industry as of May 31, 1952, was 425. Seventy-seven patents were made available for licensing between Nov. 20, 1951, and May 31, 1952 (see Appendix 9 for listing). Over 235 licenses to use these patents have been issued since the program began in Jan. 1950; 58 of these were issued from January through May of this year.

More than 750 inquiries on the subject matter have been received by the AEC from individuals and industries. An additional 300 inquiries have been directed to the Register Section, United States Patent Office, to whom copies of patent releases are made available. About 120 inquiries were directed to patents in the instrument field; 45 in the chemical field; 23 to mechanical pumps and valves; and 26 to electrical circuitry.

Finance

This report summarizes AEC finance activities during the year ended June 30, 1952. The Eleventh Semiannual Report contained a condensed annual financial report for the 1951 fiscal year.

During fiscal year 1952 AEC received three appropriations totaling $1,605,897,750.

Funds were appropriated to AEC for the last four fiscal years as follows:

	Million dollars
1949	621.9
1950	702.9
1951	2,032.1
1952	1,605.9

The initial appropriation for fiscal year 1953 amounted to $1,137,727,500. To meet the demands of the expanding program in fiscal year 1953, the Congress made a supplemental appropriation of $88,094,000 for operating expenses and $2,898,800,000 for plant and equipment. This is the largest appropriation ever made for the atomic energy program.

In appropriating funds for fiscal year 1953, the Congress introduced an entirely new development into the financial administration of the atomic energy enterprise by providing separate appropriations for operating expenses and for plant and equipment. This revised appropriation structure introduces new problems and makes changes necessary in AEC methods of financing, accounting, and auditing.

Budgeting Developments

During fiscal years 1951 and 1952 AEC developed a method of executing its cost-performance budget which begins with the issuance of a financial plan for the fiscal year to each office and field area. This plan shows costs for each program that the office will undertake in considerable detail and is then reconciled to the total obligations required. AEC allots funds to each office and field area in accordance with the total obligations shown in the financial plan for that office or area. Detailed control is exercised by constant comparison of the costs of each activity within each operating program with the budget instead of by attempting control through detailed breakdowns of allotments. Under this system the estimates of obligations to be incurred by quarters for each financial area are shown in the financial plan and form the basis on which AEC requests the Bureau of the Budget to apportion funds. This financial-plan system of control with monthly reporting of costs provides the best basis for comparing performance with budget estimates.

Financial Reporting

In addition to the monthly consolidated cost-budget report, a monthly highlight financial report containing financial data in summary form was available for use by AEC, the Joint Congressional Committee on Atomic Energy, and the Bureau of the Budget through-

out fiscal year 1952. This monthly financial report contains a consolidated balance sheet and operating statement; a summary of operating costs and comparable budget estimates for each AEC program; and statements showing the status of current-year appropriations and obligations, the total funded program and monthly cash payments. It also contains supplementary charts, graphs, and tables. These financial data on the AEC program as a whole are prepared by analyzing and combining the financial reports of all AEC offices covering their direct and contract operations. The policies and methods employed by the field offices in preparing these reports are under continuing review to insure consistency and uniformity of the data compiled.

As an additional aid in cost control, a consolidated construction report was also developed during the year. This report combines data on financial and physical progress of all projects under construction grouped according to the particular phase of the AEC operations for which they are being built.

Inventories

The quarterly reports on inventories of stores and special materials established in fiscal year 1951 provided valuable information for controlling stores during 1952. Statistics on anticipated usage as related to the amount of stores on hand spotlighted the items in long supply and those in short supply so that inventory levels could be controlled. The procedure for uniform reporting of stores inventories was supplemented at the beginning of fiscal year 1952 by a system of monthly cost and inventory reports on beryllium, zirconium, and hafnium.

Plant and Equipment

AEC plant and equipment accounts and the related depreciation reserves are classified on a comparable basis at all offices. Most AEC offices have developed property record unit catalogs that provide the basis for a common understanding on how plant and equipment costs are assembled and recorded in the property records and for distinguishing between capital and expense charges.

Depreciation

The necessity for including depreciation as an element in production cost pointed up the need for uniform depreciation policies throughout AEC. In the Commission's accrual accounting system, depreciation is recorded in the accounts; but it is regarded as a nonbudgetary ex-

pense and not included as a factor in the Commission's budget estimates. During fiscal year 1952 some AEC offices established depreciation rate committees made up of people who have an intimate knowledge of all phases of the operation to review the adequacy of depreciation rates and reserves. A Depreciation Policy Committee in Washington is now reviewing depreciation policies throughout AEC to insure uniformity.

Product Cost System

As stated in previous reports, the AEC accounting system provides cost data on the operating programs and the detailed activities that go to make up those programs. In the production program, for example, the cost reporting as well as the budget parallels the actual production steps. The unit costs of Commission products, however, have not been produced directly by the AEC accounting system and have only been arrived at by rough statistical computations. During fiscal year 1952 major emphasis was given to further development of the AEC accounting system to include a comprehensive product cost accounting system that will provide comparative data.

The comparisons that such data will make possible will be very useful in supervising, reviewing, and improving processes and operations and will be an aid in formulating and reviewing budgets. Some of the more important of these comparisons, to mention only a few, are the comparison of one period of time with another in terms of unit product costs that will reveal upward or downward trends in such costs; the comparison of unit and total production costs of different contractors producing the same product or performing the same process; the comparison of the unit costs of producing similar products such as U 235 and plutonium; and the comparison of the cost of identical purchased and produced parts.

Review of Finance Functions

By October 1951 the financial operations of the atomic energy enterprise had so increased that the Controller gave major responsibility for specific functions to three assistant controllers. One of these assistants is primarily responsible for budgets, another for accounting policy, and another for accounting operations.

In November 1951 the Washington office established a program of periodic reviews of financial activities in all AEC offices on a continuing basis. The scope of these reviews includes the financial activities of integrated contractors and is directed toward determining the adequacy of accounting systems, the effectiveness of the sys-

tem of the internal control, the adequacy of audits performed by AEC and contractor auditors, the reasonableness of cost distributions, and the accuracy of financial and cost reports.

Development of Finance Procedures

The financial policies and procedures developed to fit the Commission's Government-contractor operations have generally been tested in actual operation before being formally adopted. During fiscal year 1952 emphasis was put on supplementing and consolidating policy and procedural statements. For instance, the policies and schedule for formulating the Commission's budgets were set out in a bulletin issued October 1, 1951; and all accounting issuances were consolidated in one manual effective July 1, 1952.

Auditing

The general policies and standards established in July 1950 for auditing the accounts of contractors whose accounts are integrated with those of AEC were based on public accounting methods and standards. At the same time AEC recognized that its audit must go beyond the scope of the usual public-accounting-type audit in verifying transactions and in providing a basis for determining whether they were in accordance with the terms of the contract.

The present trend in AEC auditing is toward the broader internal-auditing approach. An audit plan is now being developed for use throughout AEC direct and contract operations that will prescribe standards for examining cost reports in addition to the reviews of the customary financial statements. Because of the importance of reliable current data as a tool for managing AEC operations, emphasis is placed upon the examination of reports submitted during the fiscal year. The audit plan puts greater emphasis on the testing of transactions to determine their propriety and the effectiveness of the system of internal control.

The aim of those making reports on AEC audits is to get the information to those responsible for operations in time for it to be useful. Consequently, the regular audit reports on a contract or an office will be supplemented by special reports whenever prompt action is needed. The reviews of individual operations will add up to a complete audit at least once a year.

The proposed plan for AEC auditing is intended to be flexible enough to encourage the individual auditor to exercise initiative and judgment. It fits in with the Government's policy as stated in the Budget and Accounting Procedures Act of 1950.

Organization and Personnel

The number of workers in the atomic energy program continued to increase during the first 6 months of 1952, principally on construction projects (see p. 10). Employment in operations and research and development increased from approximately 52,400 on January 1 to about 56,000 on June 30, an increase of about 7 percent. Direct AEC employment increased from 5,750 on January 1 to approximately 6,500 on June 30.

Labor Management Relations

There was a notable decrease during early 1952 in the amount of time lost in the construction program due to labor management disputes. Percentage of total working time lost was 1.9 as compared with 2.6 for the last 6 months of 1951. At Paducah, the percentage of time lost to estimated working time dropped from 5.6 for 1951 to 3.9 for the first 6 months of 1952. At Dana, Ind., where construction work is almost complete, the percentage of time lost dropped from 3.4 to .3 for the same period. Time lost in relation to estimated working time at Savannah River, Arco, and Fernald continued to be relatively insignificant. At Hanford this loss percentage rose from 2.6 in the last 6 months of 1951 to 5.3 in the first 6 months of 1952 as the present construction program nears completion. This same figure at Oak Ridge for all construction in the first 6 months of 1952 was 1.6.

The increased need for maintaining continuity of construction operations in atomic energy installations has emphasized the role of the Atomic Energy Labor Relations Panel and has resulted in panel intervention in several construction disputes.[8] Early in January 1952, the panel announced it would retain jurisdiction over the Paducah project for an unspecified period. The Commission believes that panel assistance to the parties to collective bargaining at Paducah has contributed to the improved work-stoppage record on that project.

Members of the panel helped resolve disputes on Hanford construction between Atkinson-Jones Construction Co. and building trades unions. After mediation failed, two sets of recommendations were issued in March and April. The first involved a wage issue, the second isolation payments.

The panel intervened in five disputes involving vital nonconstruction operations from December 1, 1951, to June 1, 1952. One dispute

[8] The Atomic Energy Labor Relations Panel was established by the President in May 1949 on the recommendation of a special commission he had appointed to study labor relations in the atomic energy installations. A report on the origin and functions of the panel appeared in the Ninth Semiannual Report of the Atomic Energy Commission, January 1951, Superintendent of Documents, Washington 25, D. C. 40 cents.

involved Sandia Corp. and two AFL unions representing separate bargaining units of production workers and office employees. Recommendations were issued after efforts to mediate had failed last winter. When the unions at first rejected these proposals, members of the panel conducted further meetings in Albuquerque until the recommendations were accepted and a settlement reached. In a dispute over wages, the panel also issued recommendations to the Zia Co., and a union representing employees at the power plant at Los Alamos. Mediation efforts were successful in a third case and the remaining two cases were still open at the end of June.[9]

Extended Workweek

In March the Commission authorized a 54-hour workweek at the Savannah River project and a 50-hour workweek at the Paducah project. This extension of the workweek was considered the most feasible means of alleviating the critical shortage of skilled construction manpower at these sites. As soon as the project requirements and manpower supply permit, these extended workweeks will be reduced. Prior to this action, the Commission consulted with the Bureau of Employment Security and other interested Government agencies to determine the effect of this extension on other segments of the defense construction program.

Communist Dominated Unions

In response to a request by the Senate Subcommittee on Labor and Labor Management Relations investigating the problem of Communist domination of unions, the Commission in December 1951 submitted a report on the measures it had taken to eliminate the United Electrical Radio and Machine Workers of America as bargaining agent for employees of the atomic energy installation at Schenectady, N. Y.[10]

Nondiscrimination Policy

The Commission was named as one of five participating agencies on the Committee on Government Contract Compliance established by Executive Order 10308 to improve the means for obtaining compliance with the nondiscrimination provisions of Federal contracts. The

[9] See Appendix 7 for the panel report for period Dec. 1, 1951, to June 1, 1952.

[10] Communist Domination of Certain Unions, Part II. Atomic Energy Commission Reply to Subcommittee Questionnaire. Report of the Subcommittee on Labor and Labor Management Relations of the Committee on Labor and Public Welfare, U. S. Senate, 82d Cong., 2d sess., U. S. Government Printing Office, Washington, 1952.

other agencies on this committee are the Department of Defense, the Department of Labor, the General Services Administration, and the Defense Materials Procurement Agency.

Safety and Fire Protection

The construction safety program continues to be the biggest part of accident prevention work in AEC activities. The efforts made in this direction during the latter part of 1951 appear to be bearing fruit in the reduction in the number and severity of injuries to personnel and in the interruptions in AEC operations. This reduction is particularly noticeable in the fatality trend which has been reduced considerably during the first 6 months of 1952. The total AEC construction accidents are reflected in a frequency rate (injuries per million man-hours) of 2.89 at the end of May 1952, as compared with 5.1 for 1951 and with the 1950 national average of 19.3 for all United States construction work as published by the National Safety Council. The severity rate (days lost per thousand man-hours) has decreased from 1.64 in 1951 to .51 at the end of May, as compared to the 1950 NSC average of 2.72. Injury experience among operations contractors has decreased from 2.7 in 1951 to 2.0 at the end of May. The frequency rate for Government employees has decreased from 1.9 in 1951 to 1.13 at the end of May. The all-industry average frequency rate for 1950 as published by the NSC was 9.3. On April 19, 1952, the du Pont Co., prime contractor to the AEC at the Savannah River plant, set a new world safety record for the construction industry with a total of 6,275,072 continuous man-hours worked without a disabling injury.

In all areas, contractor's acceptance of the Commission safety objectives appears to be good as evidenced by the existence of definite safety programs, qualified safety and fire protection personnel, good accident reporting, and continuing exchange of information. In many instances, the contractor's total company experience has been favorably affected by its contract with the AEC.

Contractor selection boards at all Operations Offices now are using AEC-suggested health and safety criteria in selecting contractors. Against these criteria are measured the past experience of the prospective contractor's frequency and severity rates, casualty and fire insurance rates, reputation, and safety attitude.

Fire Protection

The level of fire protection in AEC communities, as judged by the standards of the National Board of Fire Underwriters, is better than

the national average and is consistent with the standards of the Commission. Industrial fire loss experience is substantially below national experience. Over the past 5 years, substantial fire department operating economies have been effected.

Two major industrial fires have increased the fire loss for the first 6 months of 1952 above the previous average for the Commission. The AEC fire loss ratio, however, continues to be low when compared with the national average.

Agreement with Department of Defense on Restricted Data

As a result of discussions between the Commission and the Department of Defense an agreement has been reached whereby personnel of the Department of Defense and its contractors may be afforded access to restricted data by Commission personnel on the basis of military security clearances; thereafter access to restricted data which has been transmitted to the Department of Defense and its contractors will be governed in accordance with clearance procedures of the agencies of the Department of Defense based upon classification criteria jointly established by the Atomic Energy Commission and the Department of Defense.

The agreement also provides that the Department of Defense and its agencies shall be responsible for safeguarding restricted data made available pursuant to procedures developed to implement this agreement. Requests for access to restricted data in the hands of Atomic Energy Commission personnel must be submitted in writing by a major administrative or higher military headquarters on a "need to know" basis, with the request indicating the clearance status of the individuals who are to be authorized to have such access.

Information and Educational Services

In the interest of providing an opportunity for newsmen and civil defense officials to acquire information useful to the general public, the AEC made special arrangements to have limited numbers representing each of these groups admitted to the Nevada Proving Ground for relatively close observation of an atomic detonation on April 22, 1952. With provision for safeguarding of restricted data and the safety of the observers, approximately 200 representatives of news media—press, periodicals, radio, television, newsreels and still-picture syndicates—were afforded a view, alongside 62 selected members of State, Federal, and Territorial Civil Defense organizations, of an atomic

detonation from a vantage point about 10 miles from "Ground Zero." Also included in the contingent were about 25 Nevada officials whose responsibilities of office necessitate close relationships with the AEC test organization at the Proving Ground.

The "Observer Project," as this program was called, generated from requests which came to the AEC as early as the first establishment of the Continental test site. Contending that public interest was served by their text and picture reports of detonations, newsmen had requested opportunity to see a test from within the site rather than from outside the restricted area. The Federal Civil Defense Administration had also indicated strong interest in obtaining for top civil defense officials an opportunity for close observation of an atomic detonation.

After careful analysis of the security and safety considerations required under the circumstances, the AEC acceded to the requests to the extent of permitting a limited number of observers to witness the April 22 detonation.

Management of the "Observer Project" was closely coordinated among representatives of the public information staffs of the Atomic Energy Commission, the Department of Defense and the Federal Civil Defense Administration, with strong support from the Test Organization of the Nevada Proving Ground.

Stock Film Footage Program

Primarily to encourage graphic education and information in the field of atomic energy, the Commission made available in June, 100,000 feet of unedited, assembled 35 mm. black and white stock film footage without sound track. The footage is currently being distributed at standard Government cost rates through a Government depository in Long Island City, N. Y. It was made during 1950–51 on the suggestion and with the guidance of educational motion picture producers and educators both in and out of the Government.

The material covers unclassified AEC and contractor activities in the fields of medical, biological, physical, and agricultural research; engineering, radiation chemistry, nuclear reactors, particle accelerators, radioisotope production and use, radiation detection instruments, health physics, meteorology, communities, construction, metallurgy, remote control devices, security, and limited declassified aspects of weapons development, and production of fissionable material. Thirteen installations Nation-wide, including the national laboratories, are represented in the coverage.

Aware that security and other operational considerations make it extremely difficult and often impossible for commercial and Govern-

ment units to take their own footage at atomic energy installations, the Commission designed the project to serve educational motion picture and television producers, newsreels, and Government agencies (including AEC's own contractors who are planning to use the material for training and orientation).

Though unedited, the footage has been assembled in progression to aid producers in making complete motion pictures, adding their own film editing, narration, music, and titles. Almost 600 pages of detailed script notes have been keyed to the footage, in addition to a 3,500-card cross-index.

Traveling Exhibit on Atomic Energy

A traveling exhibit on atomic energy, sponsored jointly by the National University Extension Association and the American Museum of Atomic Energy at Oak Ridge, has completed its first year of operation. It was viewed by over 400,000 persons in 32 separate localities in 12 States. The exhibit proved an effective instrument in bringing information on atomic energy, with emphasis on its peacetime applications, to both school children and adults.

Occupying approximately 10,000 square feet of space, it consists of panels, models and appropriate scientific instruments covering in detail such major subjects as: Basic facts about the atom, radioactivity, separation of U 235 and U 238, plutonium, nuclear energy, radioisotopes in agriculture and medicine, atomic power, and A-bomb effects. Its showing in each locality was supplemented by appropriate lectures and guided tours, conducted by local society members and students especially trained for this purpose.

Following is a list of States where the exhibit has been shown, with the sponsoring organization: Alabama, University of Alabama; Pennsylvania, Penn State College and the Philadelphia Inquirer; Michigan, University of Michigan and the Detroit News; Wisconsin, University of Wisconsin; Oregon, Oregon State System of Higher Education; Utah, Brigham Young University; Arizona, University of Arizona; Colorado, University of Colorado; North Dakota, University of North Dakota; Minnesota, University of Minnesota and the Minneapolis Star and Tribune; Idaho, Idaho Operations Office, U. S. Atomic Energy Commission; California, University of California. Present requests for the exhibit assure its scheduling through June 1954.

Radioisotopes Course for Teachers

Under the sponsorship of the Board of Education of the City of New York, in cooperation with the AEC, in February 1952 there was

offered for the first time a course for teachers in the use of radioactive isotopes in New York City science classrooms.

Entitled "Radioisotopes—A New Aid to High School Teachers" the course consisted of 15 lecture-demonstrations given by staff members of AEC's New York Operations Office, Brookhaven National Laboratory, the University of Rochester, and other nearby institutions.

Radioactive iodine and radioactive phosphorus were used in the demonstration which covered the applications of these new research tools in the field of chemistry, physics, and biology. It is anticipated that the more than 300 teachers who attended the course will put their new knowledge to use in their classes, bringing to high school students the benefits of atomic science.

In June 1952 a similar course, concentrated within 1 week, was held for a group of Washington State teachers in Seattle. This course was sponsored by the Department of Public Instruction of the State of Washington, in cooperation with the Hanford Operations Office.

Technical Information Program

During the 6 months covered by this report, the Commission and its contractors have continued to operate technical information services for the purpose of (*a*) organizing and servicing classified data for use within the atomic energy program, and (*b*) disseminating the maximum amount of technical information that can safely be released for the use and interest of science and industry generally.

With respect to the latter increased emphasis has been placed upon the release of technology developed to meet project problems which also is likely to be of use in general industry.

During this period the Ad Hoc Committee on Technological Information for Industry, which was formed in 1949, was reconstituted as the Advisory Committee on Technological Information. The Committee is composed of 17 representatives of professional societies and industrial publications (see Appendix 2).

At the request of the Commission this group will continue its survey and evaluation from the viewpoint of industry, of specific fields of AEC-developed technology for the purpose of identifying information which should be submitted for classification. The Committee will also offer recommendations for providing the widest possible dissemination of unclassified AEC information by the technical and business press of the country.

A committee of contractors' representatives has been appointed to study this problem from the contractor's point of view, and to work with the Advisory Committee on Technological Information. This committee will be responsible for prompt implementation of recom-

mendations for improving the availability of AEC-developed technology which may be declassified.

Declassification of Reactor Information

As a result of recommendation by the delegates to the Fifth International Declassification Conference held in September 1951 in Washington, the AEC has authorized the declassification of additional information on the nuclear properties of uranium useful in the understanding and development of low power nuclear reactors for atomic research.

To speed the development of unclassified reactor technology the Commission initially authorized the release of design and operating data on such reactors in November 1950. This subsequent declassification action will make available to universities and laboratories engaged in unclassified research with nuclear reactors further data that will advance their studies. In taking this action the Commission has adopted a policy of complete declassification of low power research reactor theory so that research reactors may be used to fullest advantage in training programs and scientific research. Low power research reactors cannot be used for production of atomic weapons or power.

The information now declassified includes values for the fast fission constants for natural uranium and the resonance absorption integral for natural uranium and its oxides. It includes the numerical values of the thermal neutron fission and capture cross sections for plutonium. Also released was the fact that three neutrons are released per plutonium fission. Prior to this, only the 2½ neutrons released by uranium 235 under similar conditions had been disclosed.

In addition to releasing further information on the low power research reactors, the Commission authorized the declassification of the thermal neutron absorption cross section of xenon 135 (3.5 million barns). This radioactive isotope, one of the products resulting from the fissioning of uranium, is a remarkably effective absorber of thermal neutrons. The release of such information on the nuclear properties of xenon 135 will be of basic scientific interest in studies of nuclear structure and will aid in fundamental studies on reactor control. Technical reports concerning the newly declassified information will be published in scientific journals from time to time.

The Commission has also approved declassification of all information necessary for the design, construction and operation of the following low power research reactors:

CP–1, the First Pile (graphite and natural uranium), Chicago, Ill., which has now been dismantled.

CP-2 (graphite and natural uranium), at the Cook County (Ill.) Forest Preserve site of the Argonne National Laboratory.

CP-3 (heavy water and natural uranium), at Argonne National Laboratory, DuPage County (Ill.).

Low Power Water Boiler (light water and enriched uranium), Los Alamos (N. Mex.) Scientific Laboratory.

High Power Water Boiler (light water and enriched uranium), LASL.

Super Power Water Boiler (light water and enriched uranium), LASL.

Consolidated University of North Carolina Research Reactor (light water and enriched uranium), on campus of North Carolina State College, Raleigh, N. C.

APPENDIX 1

U. S. Atomic Energy Commission, Principal Staff, and Managers of Operations and Area Offices

Atomic Energy Commission	Gordon Dean, *Chairman.*
	T. Keith Glennan.
	Thomas E. Murray.
	H. D. Smyth.
	Eugene M. Zuckert.
General Manager	M. W. Boyer.
Deputy General Manager	Walter J. Williams.
Assistant to Deputy General Manager	James L. Kelehan.
Controller	Francis J. McCarthy (*Acting*).
General Counsel	Everett L. Hollis.
Secretary to Commission	Roy B. Snapp.
Director, Office of Industrial Development	William L. Davidson.
Director of Intelligence	Walter F. Colby.
Director of Classification	James G. Beckerley.
Chief, Office of Special Projects	John A. Hall.
Director, Division of Research	Thomas H. Johnson.
Director, Division of Engineering	Lawrence R. Hafstad (*Acting*).
Director, Division of Production	R. W. Cook.
Director, Division of Military Application	Brig. Gen. K. E. Fields.
Director, Division of Reactor Development	Lawrence R. Hafstad.
Director, Division of Biology and Medicine	Dr. John C. Bugher.
Director, Division of Raw Materials	Jesse C. Johnson.
Director, Division of Construction and Supply	E. J. Bloch.
Director, Division of Security	John A. Waters, Jr.
Director, Division of Organization and Personnel	Oscar S. Smith.
Director, Division of Information Services	Morse Salisbury.

Managers of Operations and Area Offices:	
Chicago (Ill.) Operations Office	A. TAMMARO.
Ames (Iowa) Area Office	W. W. LORD.
Berkeley (Calif.) Area Office	H. A. FIDLER.
Lockland (Ohio) Area Office	E. M. VELTEN.
Pittsburgh (Pa.) Area Office	LAWTON D. GEIGER.
Colorado (Grand Junction) Raw Materials Office	FRANK H. MACPHERSON.
Hanford (Wash.) Operations Office	DAVID F. SHAW.
Idaho (Idaho Falls) Operations Office	L. E. JOHNSTON.
New York (N. Y.) Operations Office	WILBUR E. KELLEY.
Brookhaven (Long Island, N. Y.) Area Office	E. L. VAN HORN.
Cleveland (Ohio) Area Office	BUFORD SPARKS.
Fernald (Cincinnati, Ohio) Area Office	C. L. KARL.
St. Louis (Mo.) Area Office	J. PERRY MORGAN.
Oak Ridge (Tenn.) Operations Office	S. R. SAPIRIE.
Dayton (Miamisburg, Ohio) Area Office	JOHN H. ROBERSON.
Kentucky (Paducah) Area Office	ERNEST A. WENDE.
San Francisco (Calif.) Area Office	JOHN A. DERRY.
Santa Fe (Albuquerque, N. Mex.) Operations Office	CARROLL L. TYLER.
Eniwetok Field Office (Albuquerque, N. Mex.)	PAUL W. SPAIN.
Los Alamos (N. Mex.) Field Office	RALPH P. JOHNSON.
Las Vegas (Nev.) Field Office	SETH R. WOODRUFF, JR.
Pantex (Amarillo, Tex.) Field Office	WALTER W. STAGG.
Sandia (N. Mex.) Field Office	DANIEL F. WORTH, JR.
Savannah River (Augusta, Ga.) Operations Office	CURTIS A. NELSON.
Dana (Terre Haute, Ind.) Area Office	CHARLES W. REILLY.
Wilmington (Del.) Area Office	D. E. IRONS.
Schenectady (N. Y.) Operations Office	JON D. ANDERSON.

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P. JOHNSON.
WOODRUFF, Jr.
W. STAGG.
F. WORTH, Jr.

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APPENDIX 2

MEMBERSHIP OF COMMITTEES

STATUTORY COMMITTEES

Joint Committee on Atomic Energy—Eighty-second Congress

This committee was established by the Atomic Energy Act of 1946 (sec. 15) to make "continuing studies of the activities of the Atomic Energy Commission and of problems relating to the development, use, and control of atomic energy." The committee is kept fully and currently informed with respect to the Commission's activities. Legislation relating primarily to the Commission or to atomic energy matters are referred to the committee. The committee's membership is composed of nine members of the Senate and nine members of the House of Representatives.

Senator BRIEN MCMAHON (Connecticut), *Chairman.*[1]
Representative CARL T. DURHAM (North Carolina), *vice chairman.*
Senator RICHARD B. RUSSELL (Georgia).
Senator EDWIN C. JOHNSON (Colorado).
Senator TOM CONNALLY (Texas).[2]
Senator CLINTON P. ANDERSON (New Mexico).
Senator BOURKE B. HICKENLOOPER (Iowa).
Senator EUGENE D. MILLIKIN (Colorado).
Senator WILLIAM F. KNOWLAND (California).
Senator JOHN W. BRICKER (Ohio).
Representative CHET HOLIFIELD (California).
Representative MELVIN PRICE (Illinois).
Representative PAUL J. KILDAY (Texas).
Representative HENRY M. JACKSON (Washington).
Representative W. STERLING COLE (New York).
Representative CHARLES H. ELSTON (Ohio).
Representative CARL HINSHAW (California).
Representative JAMES E. VAN ZANDT (Pennsylvania).
WILLIAM L. BORDEN, *executive director.*
HAROLD BERGMAN, *deputy director.*

Military Liaison Committee

Under sec. 2 (c) of the Atomic Energy Act of 1946, as amended, "there shall be a Military Liaison Committee consisting of a Chairman, who shall be the head thereof, and of a representative or representatives of the Departments of the Army, Navy, and Air Force, detailed or assigned thereto, without additional compensation, in such number as the Secretary of Defense may determine. Representatives from each of the three Departments shall be designated by the respective Secretaries of the Army, Navy, and Air Force. The committee Chairman shall be appointed by the President, by and with the advice and

[1] Deceased July 28, 1952.
[2] Senator Tom Connally resigned from the joint committee effective July 5. Senator Lyndon B. Johnson (Texas) was appointed a member of the committee the same day.

consent of the Senate, and shall receive compensation at a rate prescribed by law for the Chairman of the Munitions Board. The Commission shall advise and consult with the committee on all atomic energy matters which the committee deems to relate to military applications, including the development, manufacture, use and storage of bombs, the allocation of fissionable material for military research, and the control of information relating to the manufacture or utilization of atomic weapons. The Commission shall keep the committee fully informed of all such matters before it and the committee shall keep the Commission fully informed of all atomic energy activities of the Department of Defense. The committee shall have authority to make written recommendations to the Commission on matters relating to military applications from time to time as it may deem appropriate. If the committee at any time concludes that any action, proposed action, or failure to act of the Commission on such matters is adverse to the responsibilities of the Department of Defense, derived from the Constitution, laws, and treaties, the committee may refer such action, proposed action, or failure to act to the Secretary of Defense. If the Secretary concurs, he may refer the matter to the President, whose decision shall be final."

Hon. ROBERT LEBARON, chairman.
Maj. Gen. HERBERT B. LOPER, United States Army.
Maj. Gen. STANLEY R. MICKELSEN, United States Army.
Capt. JAMES S. RUSSELL, United States Navy.
Rear Adm. FREDERIC S. WITHINGTON, United States Navy.
Maj. Gen. JAMES E. BRIGGS, United States Air Force.
Maj. Gen. HOWARD G. BUNKER, United States Air Force.
Capt. R. P. HUNTER, executive secretary, United States Navy.

General Advisory Committee

This committee was established by the Atomic Energy Act of 1946 (sec. 2 (b)). The nine civilian members are appointed by the President to advise the Commission on scientific and technical matters relating to materials, production, and research and development. Under the Atomic Energy Act, the committee shall meet at least four times in every calendar year; the committee held its first meeting in January 1947, and to date has averaged six meetings a year.

Dr. J. ROBERT OPPENHEIMER, chairman; director, Institute for Advanced Study, Princeton, N. J.
Dr. OLIVER E. BUCKLEY, chairman, Bell Telephone Laboratories, New York, N. Y.
Dr. JAMES B. CONANT, president, Harvard University, Cambridge, Mass.
Dr. LEE A. DUBRIDGE, president, California Institute of Technology, Pasadena, Calif.
Dr. W. F. LIBBY, professor of chemistry, University of Chicago, Chicago, Ill.
EGER V. MURPHREE, president, Standard Oil Development Co., New York, N. Y.
Dr. I. I. RABI, professor of physics, Columbia University, New York, N. Y.
Dr. JOHN VON NEUMANN, professor, school of mathematics, Institute for Advanced Studies, Princeton, N. J.
WALTER G. WHITMAN, chairman, Research and Development Board, Department of Defense, Washington, D. C., on leave from his position as head, department of chemical engineering, Massachusetts Institute of Technology, Cambridge, Mass.
Dr. RICHARD W. DODSON, secretary; chairman, department of chemistry, Brookhaven National Laboratory, Upton, Long Island, N. Y.

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PATENT COMPENSATION BOARD

This board was established in April 1949 pursuant to section 11 of the Atomic Energy Act of 1946, which provides that upon application for just compensation or awards or for the determination of a reasonable royalty fee certain proceedings shall be held before such a board. To date the board has held 9 sessions; 10 cases have been filed, of which 6 have been finally determined by the board; 1 claim has been awarded and 1 claim has been withdrawn.

CASPER W. OOMS, chairman; of Dawson & Ooms, Chicago, Ill.
ISAAC HARTER, chairman, Babcock & Wilcox Tube Co., Beaver Falls, Pa.
JOHN V. L. HOGAN, consulting engineer, Hogan Laboratories, Inc., New York, N.Y.

PERMANENT PANEL APPOINTED BY THE PRESIDENT—ATOMIC ENERGY LABOR RELATIONS PANEL

The members of this panel were appointed by the President in 1949 and in 1950 to take jurisdiction and mediate labor-management disputes which threaten to interfere with essential operations of the Atomic Energy Commission. The panel operates under procedures designed to safeguard continuity of operations while not inhibiting free collective bargaining between AEC contractors and unions. To date it has acted upon 45 labor-management disputes in AEC installations, and has reported semiannually to the President on its activities (see Appendix 7).

WILLIAM H. DAVIS, chairman; of Davis, Hoxie & Faithfull, New York, N. Y.; chairman, Patent Survey Committee, United States Department of Commerce.
FRANK P. DOUGLASS; of Douglass & Douglass, Oklahoma City, Okla.
JOHN T. DUNLOP, professor of economics, Harvard University, Cambridge, Mass.; public member, Wage Stabilization Board.
AARON HORVITZ, lawyer and arbitrator, New York and New Jersey.
GODFREY P. SCHMIDT, lawyer, New York, N. Y.
EDWIN E. WITTE, chairman, department of economics, University of Wisconsin, Madison, Wis.

SENIOR RESPONSIBLE REVIEWERS

The Manhattan District appointed and the Atomic Energy Commission reaffirmed the need for the committee of Senior Responsible Reviewers. The committee reviews the major phases of the AEC program and is the principal advisor to the AEC on declassification matters, making recommendations for formulating and modifying the rules and guides for declassifying scientific and technical information.

Dr. W. C. JOHNSON, chairman, department of chemistry, University of Chicago, Chicago, Ill.
Dr. J. M. B. KELLOGG, division leader, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
Dr. W. F. LIBBY, professor of chemistry, University of Chicago, Chicago, Ill.
Dr. R. L. THORNTON, professor of physics, University of California, Berkeley, Calif.

ADVISORY BODIES TO THE ATOMIC ENERGY COMMISSION

Advisory Committee on Biology and Medicine

The Advisory Committee on Biology and Medicine was created in September 1947, on the recommendation of the Commission's Medical Board of Review. The committee reviews the AEC programs in medical and biological research and health and recommends to the Commission general policies in these fields. The committee has held 32 meetings and reports to the Commission on each meeting.

Dr. ALAN GREGG, chairman; director for medical sciences, Rockefeller Foundation, New York, N. Y.
Dr. EDWARD A. DOISY, director, department of physiology and biochemistry, St. Louis University School of Medicine, St. Louis, Mo.
Dr. GIOACCHINO FAILLA, head, department of radiology, Columbia University Medical School, New York, N. Y.
Dr. E. C. STAKMAN, chief, division of plant pathology and botany, University of Minnesota, Minneapolis, Minn.
Dr. CURT STERN, professor of zoology, University of California, Berkeley, Calif.
Dr. SHIELDS WARREN, pathologist, New England Deaconess Hospital, Boston, Mass.
Dr. JOSEPH T. WEARN, dean, school of medicine, Western Reserve University, Cleveland, Ohio.

Advisory Committee on Chemistry

This committee was appointed in June 1949 to advise on policy concerning the AEC program of supporting basic unclassified chemistry research in universities, and the relationship of this program to the AEC's own chemistry research program. Most of the work of the committee is accomplished by individual consultation as specific problems arise.

Dr. FARRINGTON DANIELS, professor of chemistry, University of Wisconsin, Madison, Wis.
Dr. G. B. KISTIAKOWSKY, professor of chemistry, Harvard University, Cambridge, Mass.
Dr. JOSEPH E. MAYER, professor of chemistry, University of Chicago, Chicago, Ill.
Dr. DON M. YOST, professor of chemistry, California Institute of Technology, Pasadena, Calif.

Community Operations Panel

This committee was appointed in July 1950 to study the problems of introducing private ownership of real property and self-government in the AEC communities at Los Alamos, N. Mex.; Richland, Wash.; and Oak Ridge, Tenn. The committee has visited the three communities and made detailed reports to the Commission relating to these problems.

RICHARDSON G. SCURRY, chairman; of Scurry, Scurry & Pace, Dallas, Tex.
FREDERICK M. BABCOCK, private consultant in construction finance and housing. Washington, D. C.
GEORGE E. BEAN, city manager, Grand Rapids, Mich.
GEORGE GOVE, former vice president for housing projects, Metropolitan Life Insurance Co., New York, N. Y.

Advisory Board of Contract Appeals

This board was established in February 1950. One or more of its members hears contract appeals arising under the "disputes articles" of AEC contracts and subcontracts and makes recommendations to the General Manager concerning their disposition.

SHELDON ELLIOTT, dean of the law school, University of Southern California, Los Angeles, Calif.

HERBERT F. TAGGART, assistant dean, school of business administration, University of Michigan, Ann Arbor, Mich.

Advisory Committee on Isotope Distribution

This committee was originally appointed by the Manhattan District to advise on the off-project distribution of isotopes. The Commission approved its continuation in December 1947 to aid in establishing new policies on distributing radioactive materials and to review existing policies. The committee reviews all initial applications for use of radioisotopes in human beings, and all other requests for their use in research, education, and industry which are referred to it by the Commission.

Dr. FARRINGTON DANIELS, chairman; professor of chemistry, University of Wisconsin, Madison, Wis.

Dr. AUSTIN M. BRUES, director, biology division, Argonne National Laboratory, Chicago, Ill.

Dr. SIMEON T. CANTRIL, Tumor Institute of the Swedish Hospital, Seattle, Wash.

Dr. RICHARD CHAMBERLAIN, University of Pennsylvania Medical School, Philadelphia, Pa.

Dr. SAMUEL E. EATON, A. D. Little, Inc., Cambridge, Mass.

Dr. ROBLEY D. EVANS, professor of physics, Massachusetts Institute of Technology, Cambridge, Mass.

Dr. STERLING B. HENDRICKS, head chemist, Bureau of Plant Industry, Soils and Agricultural Engineering, United States Department of Agriculture, Beltsville, Md.

Dr. A. H. HOLLAND, Jr., medical director, Armour Research Laboratory, Chicago, Ill.

Dr. DONALD E. HULL, research chemist, process division, California Research Corp., Richmond, Calif.

Dr. EDITH H. QUIMBY, associate professor of radiology, College of Physicians and Surgeons, Columbia University, New York, N. Y.

Dr. HOWARD E. SKIPPER, associate director, Southern Research Institute, Birmingham, Ala.

Dr. PAUL C. AEBERSOLD, secretary; chief, isotopes division, AEC, Oak Ridge, Tenn.

Patent Advisory Panel

This panel was appointed in January 1947 to make a general review and appraisal of the problems raised by the patent provisions of the Atomic Energy Act of 1946. It makes informal reports and recommendations to the Commission and its staff on various questions of policy and procedure relating to patents and inventions.

H. THOMAS AUSTERN; of Covington & Burling, Washington, D. C.
WILLIAM H. DAVIS; of Davis, Hoxie & Faithfull, New York, N. Y.; chairman, Patent Survey Committee, United States Department of Commerce.
JOHN A. DIENNER; of Brown, Jackson, Boettcher & Dienner, Chicago, Ill.
HECTOR M. HOLMES; of Fish, Richardson & Neave, Boston, Mass.
CASPER W. OOMS; of Dawson & Ooms, Chicago, Ill.

Advisory Committee on Personnel Management

This committee of leading authorities from government, industry, and education was named in September 1948 to provide the Atomic Energy Commission with a continuous review of its personnel management practices and to evaluate the best personnel methods of government and industry in determining over-all AEC policies. The committee usually meets once a month.

ARTHUR S. FLEMMING, chairman, assistant to the director of manpower, Office of Defense Mobilization, Washington, D. C.; president, Ohio Wesleyan University, Delaware, Ohio.
LAWRENCE A. APPLEY, president, American Management Association, New York, N. Y.
L. CLAYTON HILL, professor of industrial relations, University of Michigan, Ann Arbor, Mich.
ROBERT RAMSPECK, chairman, United States Civil Service Commission, Washington, D. C.
WALLACE SAYRE, professor of public administration, school of business and civic administration, City College of New York, N. Y.
THOMAS G. SPATES, professor of industrial administration, Yale University, New Haven, Conn.; former vice president, General Foods Corp.

Personnel Security Review Board

This board was appointed in March 1949 primarily to review specific personnel security cases which arise under the Commission's administrative review procedure and make recommendations concerning them to the General Manager. The board, in its monthly meetings, also advises the Commission on the broader considerations regarding personnel security, such as criteria for determining eligibility for security clearance and personnel security procedures.

GANSON PURCELL, chairman; of Purcell & Nelson, Washington, D. C.
ARTHUR S. FLEMMING, assistant to the director of manpower, Office of Defense Mobilization, Washington, D. C.; president, Ohio Wesleyan University, Delaware, Ohio.
WILLIAM E. LEAHY, president, Columbus University, Washington, D. C.

Committee on Raw Materials

This committee was appointed in October 1947 to review the Atomic Energy Commission's raw materials program and to advise on questions of exploration, development, and procurement. The committee has met 10 times since its formation.

Dr. DONALD H. MCLAUGHLIN, chairman; president, Homestake Mining Co., San Francisco, Calif.

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EVERETTE L. DEGOLYER, petroleum geologist, DeGolyer & McNaughton, Dallas, Tex.
THOROLD F. FIELD, consulting mining engineer, Duluth, Minn.
J. K. GUSTAFSON, consulting geologist, M. A. Hanna Co., Cleveland, Ohio.
IRA B. JORALEMON, geologist, San Francisco, Calif.
WALTER L. MAXON, vice president, Oliver Iron Mining Co., Duluth, Minn.
ERNEST H. ROSE, chemical engineer, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
WALTER O. SNELLING, director of research and consulting chemist, Trojan Powder Co., Allentown, Pa.
ORVIL R. WHITAKER, consulting mining engineer, Denver, Colo.
CLYDE E. WILLIAMS, director, Battelle Memorial Institute, Columbus, Ohio.

Industrial Committee on Reactor Location Problems

The committee will assist and advise the Commission in determining the criteria to be used in the location of atomic energy plants with regard to populated areas and in evaluating the adequacy and necessity for the isolation of such plants. It will balance carefully the technical and scientific aspects of reactor hazards, which have been thoroughly developed by the Reactor Safeguard Committee, against the nontechnical aspects of reactor locations. Consideration will be given to such matters as the social and economic impact on adjacent communities of large scale Government acquisition of land.

C. ROGERS MCCULLOUGH, chairman; General Development Department, Monsanto Chemical Co., St. Louis, Mo.
W. P. CONNER, JR., manager, physics div., research department, Hercules Powder Co., Wilmington, Del.
R. L. DOAN, manager, atomic energy division, Phillips Petroleum Co., Idaho Falls, Idaho.
K. R. OSBORN, manager of industrial development, general chemical division, Allied Chemical and Dye Corp., New York, N. Y.
D. A. ROGERS, manager, central engineering, Allied Chemical & Dye Corp., Morristown, Pa.
REUEL C. STRATTON, supervising chemical engineer, engineering & loss control division, The Travelers Insurance Co., Hartford, Conn.

Reactor Safeguard Committee

This committee was established in the fall of 1947 to advise the Commission on the hazards of the operation of reactors. The committee reviews safety studies made by the contractors on proposed reactors for completeness and accuracy and may make recommendations for modifications or further study. This committee of experts in the fields of physics, chemistry, sanitary engineering, meteorology and medicine meets whenever problems arise which require its consideration. In the past this has been about four times a year.

Dr. EDWARD TELLER, chairman; professor, Institute of Nuclear Studies, University of Chicago, Chicago, Ill.
Dr. MANSON BENEDICT, professor of chemical engineering, Massachusetts Institute of Technology, Cambridge, Mass.
Dr. HYMER L. FRIEDELL, director, department of radiology, Lakeside Hospital, Western Reserve University, Cleveland, Ohio.

Dr. I. B. JOHNS, assistant director, central research department, Monsanto Chemical Co., Dayton, Ohio.

Dr. MARK M. MILLS, ONR, James Forrestal Research Center, Princeton University, Princeton, N. J.

Dr. FREDERICK SEITZ, professor of physics, University of Illinois, Urbana, Ill.

Dr. HARRY WEXLER, chief, scientific services division, U. S. Weather Bureau, Department of Commerce, Washington, D. C.

Dr. ABEL WOLMAN, head, department of sanitary engineering, Johns Hopkins University, Baltimore, Md.

Stack Gas Problem Working Group

The appointment of this group was authorized in May 1948 to advise the Commission on the development of methods and equipment for keeping the atmosphere at and near AEC installations free of toxic or radioactive contamination. The group has held five meetings. Individual members also give consulting advice on specific proposals and problems.

Dr. ABEL WOLMAN, chairman; head, department of sanitary engineering, Johns Hopkins University, Baltimore, Md.

Dr. PHILIP DRINKER, professor of industrial hygiene, Harvard University School of Public Health, Boston, Mass.

Dr. LYLE GILBERTSON, research division, Air Reduction Sales Co. Laboratory, New York, N. Y.

Dr. H. FRASER JOHNSTONE, professor of chemical engineering, University of Illinois, Urbana, Ill.

Dr. MOYER D. THOMAS, department of agricultural research, American Smelting & Refining Co., Salt Lake City, Utah.

Dr. WILLIAM P. YANT, director of research, Mine Safety Appliances Co., Pittsburgh, Pa.

Technical Information Panel

This panel, representing the major AEC research contractors, was appointed in June 1948 to advise the Commission on all aspects of its technical information services. Meetings are held three times a year to consider technical information services.

Dr. ALBERTO F. THOMPSON, chairman; chief, technical information service, division of information services, AEC, Washington, D. C.

Dr. HENRY A. BLAIR, director, Atomic Energy Project, University of Rochester, Rochester, N. Y.

BREWER F. BOARDMAN, head, technical information branch, Idaho Operations Office, AEC, Idaho Falls, Idaho.

W. E. DREEZEN, administrative aide to director, Ames Laboratory, Ames, Iowa.

WILLIAM H. HAMILTON, staff assistant to assistant manager, Westinghouse Atomic Power Division, Pittsburgh, Pa.

SYLVAN HARRIS, manager, documents department, Sandia Corp., Albuquerque, N. Mex.

W. L. HARWELL, head, patents and declassification department, Carbide & Carbon Chemicals Co., div. of Union Carbide & Carbon Corp. (K–25), Oak Ridge, Tenn.

EDWARD L. HILL, supervisor, technical services, General Electric Co., Lockland, Ohio.

JOHN F. HOGERTON, technical reports director, Vitro Corp. of America, New York, N. Y.

Dr. E. J. MURPHY, assistant to research director, Carbide & Carbon Chemicals Co., div. of Union Carbide & Carbon Corp. (ORNL), Oak Ridge, Tenn.
Dr. G. M. MURPHY, professor of chemistry, New York University, N. Y.
Dr. DANIEL J. PFLAUM, chief, materials and information branch, division of research, AEC, Washington, D. C.
DENNIS PULESTON, head, technical information division, Brookhaven National Laboratory, Upton, Long Island, N. Y.
Dr. RICHARD F. RILEY, chief, radiation chemistry section, Atomic Energy Project, University of California, Los Angeles, Calif.
Dr. CHARLES SLESSER, director, division of technical information and declassification, AEC, New York, N. Y.
Dr. RALPH CARLISLE SMITH, assistant director for classification and security, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
Dr. J. R. STEHN, physicist, theoretical physics division, Knolls Atomic Power Laboratory, Schenectady, N. Y.
C. G. STEVENSON, head, technical information, technical section, engineering department, General Electric Co., Richland, Wash.
Dr. R. K. WAKERLING, chief, information division, Radiation Laboratory, University of California, Berkeley, Calif.
WILLIS H. WALDO, technical editor, Mound Laboratory, Miamisburg, Ohio.
Dr. JOHN C. WOODHOUSE, director, technical division, atomic energy division, E. I. du Pont de Nemours & Co., Wilmington, Del.
Dr. H. D. YOUNG, director, information division, Argonne National Laboratory, Chicago, Ill.

Advisory Committee on Technological Information

This committee was reconstituted and expanded in April 1952 to replace an Ad Hoc Committee appointed in 1949 to advise the AEC on disseminating unclassified technological information to industry. The members will visit a number of AEC sites to identify information of use to industry which should be submitted for declassification and to recommend arrangements for the widest possible publication and distribution of such declassifiable information.

SIDNEY D. KIRKPATRICK, chairman; vice president and director of editorial development, McGraw-Hill Book Co., Inc., New York, N. Y.
JOHN BEALL, manager of publications, The American Institute of Mining and Metallurgical Engineers, New York, N. Y.
H. E. BLANK, editor, Modern Industry, Magazines of Industry, Inc., New York, N. Y.
GENE HARDY, National Association of Manufacturers, Washington, D. C.
KEITH HENNEY, editor, Nucleonics and Electronics, McGraw-Hill Publishing Co., Inc.; American Institute of Radio Engineers, New York, N. Y.
Dr. ELMER HUTCHISSON, editor, Journal of Applied Physics, American Institute of Physics, New York, N. Y.
WALTER E. JESSUP, editor, Civil Engineering, The American Society of Civil Engineers, New York, N. Y.
ANDREW W. KRAMER, editor, Power Engineering, The Technical Publishing Co., Chicago, Ill.
EVERETT S. LEE, American Institute of Electrical Engineers, New York, N. Y.
Dr. WALTER J. MURPHY, editor, Chemical and Engineering News, American Chemical Society, Washington, D. C.
D. O. MYATT, managing editor, Industrial and Engineering Chemistry, American Chemical Society, Washington, D. C.

KARL T. SCHWARTZWALDER, The American Ceramic Society, Inc., Cleveland, Ohio.

GEORGE F. SULLIVAN, managing editor, The Iron Age, Chilton Publications, Inc., New York, N. Y.

E. E. THUM, editor, Metal Progress, American Society for Metals, Cleveland, Ohio.

WALTER TOERGE, engineering editor, Steel, Penton Publishing Co., Cleveland, Ohio.

S. A. TUCKER, publications manager, American Society of Mechanical Engineers, New York, N. Y.

F. J. VAN ANTWERPEN, editor, Chemical Engineering Progress, American Institute of Chemical Engineers, New York, N. Y.

Dr. ALBERTO F. THOMPSON, secretary; chief, technical information service, division of information services, AEC, Washington, D. C.

N. H. JACOBSON, assistant secretary; technological information officer, division of information services, AEC, Washington, D. C.

APPENDIX 2

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APPENDIX 3

Major Research and Development Installations of the U. S. Atomic Energy Commission

Ames Laboratory (Iowa State College, contractor), Ames, Iowa

Director ..... Dr. Frank H. Spedding
Associate Director ..... Dr. H. A. Wilhelm
Assistant to Director ..... Dr. E. F. Fulmer

Argonne National Laboratory (University of Chicago, contractor), Chicago, Ill.

The participating institutions are:

Battelle Memorial Institute
Carnegie Institute of Technology
Case Institute of Technology
Illinois Institute of Technology
Indiana University
Iowa State College
Kansas State College
Loyola University (Chicago, Ill.)
Marquette University
Mayo Foundation
Michigan College of Mining and Technology
Michigan State College
Northwestern University
Ohio State University
Oklahoma Agricultural and Mechanical College
Purdue University
St. Louis University
State University of Iowa
Washington University (St. Louis, Mo.)
Western Reserve University
University of Chicago
University of Cincinnati
University of Illinois
University of Kansas
University of Michigan
University of Minnesota
University of Missouri
University of Nebraska
University of Notre Dame
University of Pittsburgh
University of Wisconsin

Director ..... Dr. Walter H. Zinn
Deputy Director ..... Dr. Norman Hilberry
Business Manager ..... John H. McKinley
Associate Director for University Relationships ..... Dr. Joseph C. Boyce
Assistant Director ..... John T. Bobbitt

Brookhaven National Laboratory (Associated Universities, Inc., contractor), Upton, Long Island, N. Y.

The participating institutions are:

Columbia University
Cornell University
Harvard University
Johns Hopkins University
Massachusetts Institute of Technology
Princeton University
Yale University
University of Pennsylvania
University of Rochester

Chairman, Board of Directors—GEORGE A. BRAKELEY
President, AUI—LLOYD V. BERKNER
Vice President, AUI and Laboratory Director—Dr. LELAND J. HAWORTH
Deputy Laboratory Director—Dr. GERALD F. TAPE
Assistant Director, University Liaison—Dr. ROBERT A. PATTERSON

Knolls Atomic Power Laboratory (General Electric Co., contractor), Schenectady, N. Y.

General Manager, Operating Department—K. R. VAN TASSEL
Manager, Technical Department—Dr. K. H. KINGDON

Los Alamos Scientific Laboratory (University of California, contractor), Los Alamos, N. Mex.

Director—Dr. NORRIS E. BRADBURY
Technical Associate Director—Dr. DAROL K. FROMAN

Mound Laboratory (Monsanto Chemical Co., contractor), Miamisburg, Ohio

Project Director—Dr. C. A. HOCHWALT
Executive Director, AEC Projects—Dr. JOSEPH J. BURBAGE

Oak Ridge National Laboratory (Carbide & Carbon Chemicals Co., div. of Union Carbide & Carbon Corp., contractor), Oak Ridge, Tenn.

Director—Dr. C. E. LARSON
Executive Director—(*Vacancy*)
Research Director—Dr. A. M. WEINBERG
Acting Assistant Research Director—Dr. E. H. TAYLOR
Assistant Research Director (Y-12)—Dr. E. D. SHIPLEY
Homogeneous Research Project—Dr. J. A. SWARTOUT

Oak Ridge Institute of Nuclear Studies (contractor), Oak Ridge, Tenn.

The sponsoring universities of the Institute are:

Agricultural and Mechanical College of Texas
Alabama Polytechnic Institute
Catholic University of America
Clemson Agriculture College
Duke University
Emory University
Florida State University
Georgia Institute of Technology
Louisiana State University
Mississippi State College
North Carolina State College
Rice Institute
Tulane University of Louisiana
Vanderbilt University
Virginia Polytechnic Institute
University of Alabama
University of Arkansas
University of Florida
University of Georgia
University of Kentucky
University of Louisville

University of Maryland
University of Mississippi
University of North Carolina
University of South Carolina
University of Oklahoma
University of Puerto Rico
University of Tennessee
University of Texas
University of Virginia

Chairman of Council—Dr. GEORGE H. BOYD
Vice Chairman of Council—Dr. W. W. GRIGORIEFF
President of Institute—Dr. PAUL M. GROSS
Vice President of Institute—Dr. J. W. BEAMS
Scientific and Educational Consultant—Dr. GEORGE B. PEGRAM
Executive Director of Institute—Dr. WILLIAM G. POLLARD

Radiation Laboratory (University of California, contractor) Berkeley, Calif.

Director—Dr. ERNEST O. LAWRENCE
Associate Director—Dr. DONALD COOKSEY
Business Manager and Managing Engineer—WALLACE B. REYNOLDS
Assistant Director—WILLIAM M. BROBECK
Director, Crocker Laboratory—Medical Physics—Dr. JOSEPH G. HAMILTON
Director, Donner Laboratory of Medical Physics—Dr. J. H. LAWRENCE
Assistant Director, Donner Laboratory—Dr. HARDIN JONES

Rochester Atomic Energy Project (University of Rochester, contractor) Rochester, N. Y.

Director—Dr. HENRY A. BLAIR
Assistant Director for Education—Dr. J. NEWELL STANNARD
Business Manager—C. M. JARVIS

Sandia Laboratory (Sandia Corp., contractor) Sandia Base, Albuquerque, N. Mex.

President—DONALD A. QUARLES

University of California, Los Angeles, Atomic Energy Project (University of California, contractor) Los Angeles, Calif.

Director—Dr. STAFFORD WARREN
Business Manager—ROBERT J. BUETTNER

University of California Medical Center, Radiological Laboratory (University of California, contractor) San Francisco, Calif.

Director—Dr. ROBERT S. STONE

Bettis Plant (Westinghouse Electric Corp., Atomic Power Division, contractor) Pittsburgh, Pa.

Manager, Westinghouse Atomic Power Division—C. H. WEAVER
Assistant Manager—JOHN W. SIMPSON
Director of Development—Dr. W. E. SHOUPP
Contract Manager—W. DEE SHEPHERD

APPENDIX 4

DISTRIBUTION OF ISOTOPES, OAK RIDGE, TENN.

	NUMBER OF SHIPMENTS						
	Aug. 2, 1946, to June 30, 1947	July 1, 1947, to June 30, 1948	July 1, 1948, to June 30, 1949	July 1, 1949, to June 30, 1950	July 1, 1950, to June 30, 1951	July 1, 1951, to May 31, 1952	Total to May 31, 1952
Shipments classified by broad field of utilization:							

DISTRIBUTION OF ISOTOPES, OAK RIDGE, TENN.—Continued

DOMESTIC	TOTAL NUMBER OF SHIPMENTS TO MAY 31, 1952		FOREIGN	TOTAL NUMBER OF SHIPMENTS TO MAY 31, 1952	
	Radioactive	Stable		Radioactive	Stable
Shipments classified by State and Territory:			Shipments classified by country:		
Alabama	114	2	Argentina	70	
Arizona	9		Australia	99	
Arkansas	116		Belgium	118	
California	2,745	129	Brazil	110	
Colorado	188	2	Canada	114	
Connecticut	440	76	Chile	54	
Delaware	45	7	Colombia	5	
District of Columbia	634	110	Cuba	24	
Florida	116		Denmark	176	
Georgia	268	6	Dominican Republic	1	
Hawaii	37		Egypt	1	
Idaho	5		Finland	5	
Illinois	2,346	245	France	56	
Indiana	407	64	Iceland	3	
Iowa	287	9	India	3	
Kansas	123	10	Israel	2	
Kentucky	150	1	Italy	15	
Louisiana	383	11	Japan	81	
Maine	5		Lebanon	5	
Maryland	1,857	62	Mexico	9	
Massachusetts	2,429	217	Netherlands	48	
Michigan	966	52	New Zealand	10	
Minnesota	694	46	Norway	39	
Mississippi	14		Pakistan	3	
Missouri	716	43	Peru	9	
Montana	7	8	Portugal	1	
Nebraska	133		Spain	4	
New Hampshire	8		Sweden	160	
New Jersey	479	64	Switzerland	44	
New Mexico	37		Trieste	2	
New York	3,452	230	Turkey	5	
North Carolina	531	19	Union of South Africa	28	
North Dakota	12		United Kingdom:	135	
Tennessee	688	30	Bermuda	15	
Texas	1,187	56	Br. West Africa	1	
Utah	244	6	England	119	
Virginia	188	9	Uruguay	8	
Washington	294	16			
West Virginia	4	1	Total	1,447	
Wisconsin	646	74	Shipments classified by kind of isotope:		
Wyoming	21		Phosphorus 32	578	
			Iodine 131	349	
Total	26,923	1,923	Carbon 14	162	
			Sulfur 35	68	
			Iron 55, 59	61	
			Cobalt 60	82	
			Calcium 45	35	
			Strontium 89, 90	24	
			Other	88	
			Total	1,447	

DISTRIBUTION OF ISOTOPES TO AEC INSTALLATIONS

	Aug. 2, 1946, to June 30, 1947	July 1, 1947, to June 30, 1948	July 1, 1948, to June 30, 1949	July 1, 1949, to June 30, 1950	July 1, 1950, to June 30, 1951	July 1, 1951, to May 31, 1952	Total to May 31, 1952
Radioactive	125	388	742	1,319	1,775	1,253	5,602
Stable	152	108	191	236	368	267	1,322

APPENDIX 5

Current AEC Unclassified Research Contracts in Physical and Biological Sciences, Raw Materials, and Reactor Development [1]

PHYSICAL RESEARCH CONTRACTS [2]

Chemistry

Alabama, University of. J. L. Kassner and E. L. Grove, Principles, Theory and Practice of High Frequency Titrimetry.

Arkansas, University of. R. Arndt and P. E. Damon, Investigation of the Radioactivity of Thermal Waters and Its Relationship to the Geology and Geochemistry of Uranium.

Arkansas, University of. R. R. Edwards, Chemical Effects of Nuclear Transformation.

California Institute of Technology. N. Davidson, Complex Ions and Reaction Mechanisms in Solution.

California Institute of Technology. H. Brown, Fundamental Geochemistry.

California, University of. J. H. Hildebrand, Studies in Intermolecular Forces and Solubility.

Canisius College. R. H. Schuler, The Use of Iodine as a Radical Detector in Radiation Processes.

Carnegie Institute of Technology. T. P. Kohman, Nuclear Chemistry Research.

Catholic University of America. G. W. Castellan, Electrical Effects at Phase Boundaries.

Catholic University of America. F. O. Rice, The Thermal Production and Identification of Free Radicals.

Chicago, University of. W. F. Libby, Radiochemical and Radiobiological Research.

Chicago, University of. H. C. Urey, Natural Abundance of Deuterium and Other Isotopes.

Chicago, University of. A. Turkevich, Nuclear Chemical Research.

Colorado, University of. J. R. Lacher and J. D. Park, Thermochemical Studies of Organic Fluorine Compounds.

Columbia University. V. K. LaMer, Filtration of Aerosols.

Columbia University. V. K. LaMer, Fundamental Investigations of Phosphate Slimes.

Columbia University. J. L. Kulp, Uranium-Lead Method of Age Determination.

Columbia University. T. I. Taylor, Separation of Isotopes by Chemical Exchange.

Columbia University. J. M. Miller, Basic Chemical Research.

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[1] Contracts listed as of May 31, 1952.

[2] Physical research contracts printed in Eleventh Semiannual Report to Congress were those awarded during July–November 1951. It was not a complete list of physical research contracts as the heading indicated.

Columbia University. W. A. Selke, Ion Exchange Chromatography.

Columbia University. R. M. Noyes, Photochemical Reactions of Iodine.

Connecticut, University of. R. Ward, Trace Element Distribution Between a Melt and Solid.

Cornell University. J. L. Hoard, Structure of Fluorocarbons, Elementary Boron and Boron Compounds.

Emory University. R. A. Day, Jr., Study of the Stability of Complex Ions.

Emory University. W. H. Jones, Mass Distribution in Proton-Induced Fission.

Florida State University. R. Sheline, Search for Long Lived Radioactivities; Theoretical Nuclear Studies.

Florida State University. R. E. Johnson, Exchange Between Labelled Halogens and Certain Inorganic Halides.

Florida, University of. G. B. Butler, Studies in the Preparation and Properties of Quaternary Ammonium Ion Exchange Resins.

Fordham University. M. Cefola, Use of Thenoyl Trifluoroacetate as an Analytical Reagent.

George Washington University. C. R. Naeser, Studies of the Fluorides of the Rare Earth Elements.

Georgia Institute of Technology. J. Hine, The Occurrence and Rate of Certain Deuterium Exchange Reactions.

Illinois, University of. P. E. Yankwich, Studies in Radiochemistry.

Illinois, University of. H. G. Drickamer, The Mechanism of Molecular Motion as Determined from Diffusion and Thermal Diffusion Measurements.

Illinois Institute of Technology. H. E. Gunning, Studies on Decomposition of Organic Molecules by Metal Photosensitization.

Illinois Institute of Technology. S. E. Wood, Study of the Properties of Non-electrolytic Solutions.

Illinois Institute of Technology. M. Kilpatrick, The Fundamental Chemistry of Ozone.

Illinois Institute of Technology. M. E. Runner, The Acids of the Hydrogen Fluoride System.

Illinois Institute of Technology. R. B. Bernstein, Studies in the Field of Stable Isotopes.

Illinois Institute of Technology. G. Gibson, The Fundamental Chemistry of Uranium.

Indiana University. L. L. Merritt, Study with Radioactive Tracers.

Iowa, State University of. K. Kammermeyer, The Separation of Gases by Diffusion Through Permeable Membranes.

Iowa, State University of. L. Eyring, Preparation of Rare Earth Oxides.

Iowa, State University of. S. Wawzonek, The Behavior of Organic Compounds at the Dropping Mercury Electrode.

Iowa, State University of. R. E. Buckles, The Mechanisms of Addition of Halogen and of Halogenation Arising from the Action of Polyhalogen Complexes on Organic Molecules.

Kansas, University of. J. O. Maloney, Application of Radioactive Tracers to the Design of Distillation Columns.

Kansas, University of. P. W. Gilles, High Temperature Research.

Kansas, University of. P. W. Gilles, Hot Laboratory Assistance.

Louisville, University of. R. H. Wiley, Synthesis and Properties of Ion Exchange Resins.

Massachusetts Institute of Technology. C. D. Coryell, D. N. Hume, and J. D. Roberts, Nuclear Chemistry Research.

Massachusetts Institute of Technology. A. M. Gaudin, Techniques in Mineral Engineering.

Michigan, University of. E. F. Westrum, Jr., Low Temperature Chemical Thermodynamics.

Michigan, University of. W. W. Meinke, Nuclear Chemical Research.

Michigan State College. M. T. Rogers, Physico-chemical Investigation of the Interhalogen Compounds.

Missouri, University of. R. A. Cooley, Kinetics of Gas Phase Reaction.

New Hampshire, University of. H. M. Haendler, Inorganic Fluorides.

New Hampshire, University of. H. M. Haendler, Infra-red Spectroscopy of Inorganic Fluorides.

New York, University of. C. V. King, Measurement of Metal Dissolution Rates.

North Carolina, University of. S. Y. Tyree, Jr., The Systems: $ZrCl_4$ esters.

North Carolina, University of. S. B. Knight, The Use of the Flame Photometer for the Determination of Small Quantities of Certain Metals.

North Carolina State College. F. P. Pike, Performance of Contactors for Liquid-liquid Extractors.

Northwestern University. D. D. DeFord, Investigation of the Solution Chemistry of Ruthenium in its Lower Valence State.

Northwestern University. F. Basolo, Mechanism of Substitution Reactions of Inorganic Complexes.

Northwestern University. J. N. Pitts, Jr. Investigation of the Photochemistry of Organic Acids, Ethers, and Ketones.

Notre Dame, University of. M. Burton, Research in Radiation Chemistry.

Oklahoma A. & M. College. T. E. Moore, The Separation of Inorganic Salts by Liquid-liquid Extraction.

Oklahoma A. & M. College. P. Arthur, A) Anodic Reactions in Polarography; B) Characteristics of a New Polarographic Microelectrode.

Oklahoma, University of. J. R. Nielsen, Spectroscopic Properties of Fluorocarbons and Fluorinated Hydrocarbons.

Oregon State College. A. V. Logan, Mechanism of the Jacobsen Rearrangement.

Oregon State College. T. H. Norris and J. L. Huston, A Study of Generalized Acid Base Phenomena with Radioactive Tracers.

Oregon State College. J. Schulein, Separation of Deuterium from Hydrogen by Means of Zirconium Metal.

Oregon, University of. F. Swinehart, Construction of a Mass Spectrometer for use in Studying Chemical Reaction Kinetics in the Gas Phase.

Pennsylvania, University of. K. A. Krieger, Research in Heterogeneous Catalysis.

Pennsylvania State College. P. J. Elving, Polarography of Organic Compounds.

Pennsylvania State College. W. C. Fernelius, Stabilities of Coordination Compounds and Related Problems.

Pennsylvania State College. T. F. Bates, Mineralogy and Petrography of Uraniferous Shales and Lignites.

Pittsburgh, University of. R. Levine, Synthesis of Beta-Diketones and Beta-Ketoesters with Heterocyclic Nuclei.

Pittsburgh, University of. H. Freiser, Development of Organic Reagents for Use in Inorganic Analysis.

Purdue University. W. W. Brandt, Studies in Metal Ion Chelate Complexes.

Purdue University. T. DeVries, Polarographic Studies in Nonaqueous Solvents.

Purdue University. W. F. Edgell, Studies in Molecular Spectroscopy.

Purdue University. M. G. Mellon, Spectrophotometric Studies of Complex Molecules.

Purdue University. W. H. Johnston, Gas Phase Exchange Reactions.

Purdue University. H. C. Brown, Chemistry of the Polyvalent Metal Halides.

Princeton University. W. H. Furman, Research in Analytic Chemistry.

Princeton University. J. Turkevitch, Temporary and Permanent Effects Produced by Radiation on Solids.

Princeton University. J. Turkevitch, Study of Nucleation Processes.

Reed College. A. F. Scott, The Atomic Weight of Bismuth.

Rensselaer Polytechnic Institute. L. G. Bassett, Solvent Extraction of Inorganic Ions.

Rochester, University of. E. O. Wiig, Radiochemistry.

Rutgers University. E. R. Allen, Polar Inorganic Compounds.

Rutgers University. W. Rieman III, Analytical Chemistry of the Polyphosphates.

Southern California, University of. H. L. Friedman, Solutions of Inorganic Electrolytes in Solvents of Low Dielectric Constant.

South Carolina, University of. H. W. Davis, Study of the Mechanism of Allylic Fluorination.

Syracuse, University of. H. Linschitz, Photochemical Reactions of Complex Molecules in Condensed Phase.

Syracuse, University of. B. P. Burtt, Mechanism of Gaseous Radiation Chemical Reactions and the Chemical Reactions of Electrons.

Syracuse, University of. L. Gordon, Coprecipitation from Homogeneous Solution; Analytical Chemistry of Thorium.

Tennessee, University of. G. K. Schweitzer, Study of Radiocolloids.

Tennessee, University of. H. A. Smith, A) The Rates of Catalytic Reactions Involving Deuterium. B) The Relative Vapor Pressures of Water and Deuterium Oxide in the Presence of Certain Salts.

Tennessee, University of. P. B. Stockdale, Chattanooga Black Shale of Tennessee as a Source of Uranium.

Texas, University of. G. H. Ayres, Spectrophotometric Quantitative Determination of the Platinum Metals.

Utah, University of. H. Eyring, Research on Surface Chemistry and Zirconium Corrosion Studies.

Utah, University of. B. J. Zwolinski, Induction of Chemical Reactions by High Frequency Discharges in Gases.

Utah, University of. A. L. Wahrhaftig, Ionization and Dissociation of Molecules by Electron Bombardment.

Vanderbilt University. E. A. Jones, Raman Spectra of Some Inorganic Compounds.

Vanderbilt University. M. D. Peterson, Radiation Stability and Inorganic Radiochemistry.

Virginia, University of. W. R. Winsboro, Development and Study of Continuously Operated Ion Exchange Separation Equipment.

Washington, State College of. H. W. Dodgen, The Formulae and Stability of Complex Ions in Solution.

Washington, State College of. M. Lindner, Search for and Study of Certain Radioactive Isotopes.

Washington University. J. W. Kennedy, Separation of Lithium Isotopes.

Wayne University. R. B. Hahn, Analytical Chemistry of Radioactive Elements.

Wayne University. K. H. Gayer, Solubility of Uranium and Thorium Oxides in Dilute Acid and Base.

Western Reserve University. E. L. Pace, Thermodynamic Properties of Gases Adsorbed on Solids.

Wisconsin, University of. J. E. Willard, Application of Radioactive Isotopes to Chemical Problems.

Wisconsin, University of. E. L. King, The Rates and Mechanisms of Oxidation Reactions Involving Cerium.

Wisconsin, University of. W. J. Blaedel, High Frequency Titrations.

Wisconsin, University of. F. Daniels, Uranium Exploration and Recovery from Low Grade Ores.

Metallurgy

Alabama, University of. T. N. McVay, Research Investigations of Enamels on Metals.

Alfred University. W. B. Crandall, Ceramic Research.[3]

Alfred University. V. D. Frechette, Graphitization of Carbon.

Arkansas, University of. W. T. Smothers, Recrystallization of Aluminum Oxide.

Armour Research Foundation. M. Hansen, Phase Diagrams of Zirconium.

Bausch and Lomb Optical Company. N. J. Kreidl, Irradiation Damage to Glass.

California, University of. J. A. Pask, Mechanics of Metal Ceramic Bonding.

California, University of. E. R. Parker, Creep of Alloys.

California, University of. R. C. Grassi and H. A. Johnson, Liquid Lead-Bismuth.

Carnegie Institute of Technology. R. Smoluchowski, A) Studies of Grain Boundaries and Lattice Imperfections; B) Thermodynamic Properties of Binary Alloy Systems; C) Corrosion of Metals and Alloys.

Carnegie Institute of Technology. J. Zimmerman, Solid State at Low Temperatures.[3]

Carnegie Institute of Technology. R. F. Mehl and G. Derge, Electrochemical Studies of Nonaqueous Melts.

Carnegie Institute of Technology. R. Smoluchowski, Radiation Damage Effects.

Chicago, University of. L. Meyer, Research on the Structure and Properties of Graphite.

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[3] Contract administered through Office of Naval Research, Washington, D. C.

Columbia University. C. F. Bonilla, Heat Transfer by Natural Convection to Liquid Metals.

Columbia University. T. A. Read, Diffusionless Phase Changes in Solid Metals and Alloys.

Columbia University. C. F. Bonilla, Mass Transfer in Liquid Metal and Fused Salt Systems.

Columbia University. G. L. Kehl, Mechanism of Metallographic Etching.

Columbia University. H. H. Kellog, Electrolytic Production of Zirconium.

Columbia University. C. F. Bonilla, Boiling and Condensing of Liquid Metals.

Columbia University. W. A. Selke, Thermodynamic Properties of Sodium Vapor.

Dow Chemical Company. J. C. McDonald, The Effect of Nonmetallic and Alkali Metal Impurities on the Corrosion Characteristics of Magnesium.

General Electric Company. J. H. Hollomon, Fundamental Metallurgical Research.

General Electric Company. J. D. Nisbet, Zirconium Alloys.

Great Lakes Carbon Corporation. L. H. Juel, Graphite Studies.

Graham, Crowley, and Associates. C. A. Crowley, Electrowinning of Zirconium.

Horizons, Incorporated. E. Wainer, Investigation of New Methods for the Production of Zirconium Metal.

Horizons, Incorporated. M. Steinberg, Preparation of Thorium Metal.

Illinois, University of. F. Seitz, Experimental and Theoretical Investigation of Radiation Damage in Solid Materials.

Illinois, University of. F. Seitz, Mechanism of Substitutional Diffusion in Metals.

Illinois, University of. P. A. Beck, Annealing of Cold Worked Metals.

Illinois Institute of Technology. T. J. Neubert, Imperfections in Solids.

Iowa, State University of. N. C. Baenziger, Structure and Properties of Intermetallic Compounds.

Massachusetts Institute of Technology. B. E. Warren, Research on Nature of Distortion on Radiation Damaged Materials.

Massachusetts Institute of Technology. M. B. Bever, M. Cohen, and B. Averbach, A) Thermodynamics of Metal Solutions; B) Solid Solutions and Grain Boundaries; C) Fundamentals of Cold Working and Recrystallization.

Massachusetts Institute of Technology. S. C. Collins, Mechanical Properties of Metals at Low Temperatures.

Massachusetts Institute of Technology. F. H. Norton, Metal-Ceramic Interactions.

Massachusetts Institute of Technology. F. H. Norton, Refractories Research.

Minnesota, University of. G. W. Preckshot, Effect of Chemical Nature of Surfaces on Heat Transfer in Boiling Liquids.

North Carolina State College. K. O. Beatty, Thermal Properties of Non-Metallic Materials at High Temperatures.

Ohio State University. C. H. Shaw, Soft X-ray Absorption and Emission Spectra.

Pennsylvania, University of. R. M. Brick, Thermodynamic Study of the Iron-Oxygen-Sulfur System.

Pennsylvania State College. H. J. Read, The Corrosion of Zirconium.

Pittsburgh, University of. W. E. Wallace, Thermochemistry of Alloys.

Purdue University. K. Lark-Horovitz, Radiation Damage Studies.

Rensselaer Polytechnic Institute. H. B. Huntington, Anisotropic Self-Diffusion in Metals.

Stanford University. O. C. Shepard, Resistance of Materials to Environment of Molten Lead and Bismuth.

Sylvania Electric Products, Inc. W. E. Kingston, Self-Diffusion and High Temperature Phenomena.

Tennessee, University of. E. E. Stansbury, Energy Changes from Plastic Deformation.

Tennessee, University of. R. M. Boartz, Effect of Wetting on Heat Transfer Characteristics of Liquid Metals.

Wichita, University of. L. Lyon, Permeability Methods of Determining Surface Areas of Finely Divided Materials.

Physics

Alabama Polytechnic Institute. H. Carr, Mass Spectrometry.

Bartol Research Foundation. W. F. G. Swann, Cosmic Ray Showers and Counters.[2]

Brown University. R. A. Peck, Jr., Low Energy Proton Reactions.

California Institute of Technology. C. D. Anderson, Cloud Chamber Cosmic Ray Studies.[2]

California Institute of Technology. R. F. Bacher, Billion Volt Electron Physics.

California Institute of Technology. W. A. Fowler, Energy Levels in Light Nuclei.[2]

California, University of. R. B. Brode, Mesons and Showers.[2]

California, University of. J. R. Richardson, Proton Range Energy Studies.[2]

Chicago, University of. H. L. Anderson, High Energy Proton Studies.[2]

Chicago, University of. M. Schein, High Energy Primary Interactions.[2]

Carnegie Institute of Technology. E. Cruetz, Proton-Meson Physics.

Case Institute of Technology. E. F. Shrader, 30 Mev Gamma Ray Spectroscopy.

Columbia University. J. Rainwater, High Energy Proton Studies.[2]

Columbia University. W. W. Havens, Jr., Neutron Physics.

Columbia University. C. H. Townes, Microwave Spectroscopy.

Connecticut, University of. S. S. Friedland, Geiger-Muller Counter Research.

Cornell University. R. R. Wilson, Photon-Meson Reactions.[2]

Duke University. H. W. Newson, Fast Neutron Cross Sections.

Duke University. W. M. Nielsen, Cosmic Ray Stars.[2]

Florida, University of. D. O. Swanson, Nuclear Energy Level Studies.

George Washington University. Z. Bay, Short Life-Times.[2]

Harvard University. E. M. Purcell, Nuclear Moments and Abundances.[2]

Harvard University. N. F. Ramsey, High Energy Particle Interactions.[2]

Harvard University. J. C. Street, Cloud Chamber and Meson Studies.[2]

Illinois, University of. G. M. Almy and F. W. Loomis, Nuclear Disintegration Schemes.[2]

Illinois, University of. D. W. Kerst, High Energy Gamma Interactions.[2]

[2] Contract administered through Office of Naval Research, Washington, D. C.

Indiana, University of. A. C. G. Mitchell, Beta and Gamma Spectra.[3]

Iowa, State University of. J. A. VanAllen, Ultra High Altitude Cosmic Rays.[3]

Iowa, State University of. J. A. Jacobs, Nuclear Energy Level Studies.

Johns Hopkins University. G. H. Dieke, Molecular Spectra of Tritium and Related Spectra.

Johns Hopkins University. S. S. Hanna, Fast Neutron Cross Section Measurements.

Johns Hopkins University. S. S. Hanna, Nuclear Properties of Light Nuclei.

Johns Hopkins University. C. D. Swartz, Neutron Energy Spectra and Angular Distributions.

Johns Hopkins University. L. Madansky, Gamma Ray Spectra and Meson Capture.

Kansas State College. C. M. Fowler, Precision Beta-Ray Spectrometry.

Kansas, University of. J. D. Stranathan, Precision Proton Reaction.[2]

Massachusetts Institute of Technology. M. S. Livingston, Energy Levels and Radioactivity.[3]

Massachusetts Institute of Technology. B. Rossi, Meson Properties and Showers.[3]

Massachusetts Institute of Technology. J. R. Zacharias, Scattering, Nuclear Cross Sections, Elementary Particle Theory.[3]

Massachusetts Institute of Technology. G. R. Harrison, Echelle Spectroscopy.

Michigan, University of. W. C. Parkinson, Nuclear Proton Scattering.

Michigan, University of. H. R. Crane, High Energy Electron Kinematics.

Michigan, University of. J. M. Cork, Beta and Gamma Ray Spectra.[3]

Michigan, University of. W. E. Hazen, Cosmic Ray Showers and Penetrating Particles.[2]

Minnesota, University of. C. L. Critchfield, Heavy Particle Component.[3]

Minnesota, University of. J. H. Williams, Precision Particle Scattering.[3]

Minnesota, University of. J. H. Williams, Construction and Operation of a 50 Mev Ion Linear Accelerator.

Nebraska, University of. T. Jorgenson, Jr., Study of the Range-Energy Relation for Slow Ions.

New York University. M. H. Shamos, Cosmic Ray Research.

New York University. S. A. Korff, Relative Neutron Intensities.[3]

Notre Dame, University of. B. Waldman, Energy Spectra of Excited Nuclei.[3]

North Carolina, University of. E. D. Palmatier, Absolute Intensities of Cosmic Radiation.

North Carolina, University of. A. V. Masket, Nuclear Disintegrations in Photographic Emulsions.

Northwestern University. J. H. Roberts, Use of Photographic Emulsions Enriched with Li-6.

Nuclear Development Associates. H. Goldstein, Fast Neutron Data.

Ohio State University. J. N. Cooper, Nuclear Energy Level Studies.

Ohio State University. J. G. Daunt, Cryogenics and Nuclear Paramagnetism.

Oregon State College. E. A. Yunker, Aid in Construction of 37'' Cyclotron.

Pennsylvania, University of. F. C. Nix, Low Temperature Properties of Alloys.

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[3] Contract administered through Office of Naval Research, Washington, D. C.

Pennsylvania, University of. W. E. Stephens, Beta and Gamma Ray Studies.[2]

Pittsburgh, University of. A. J. Allen, Precision Particle Scattering.[2]

Princeton University. G. T. Reynolds, Meson Energy Spectra Stars and Bursts.[2]

Princeton University. M. G. White, Nuclear Research Using 17 Mev Protons.

Princeton University. L. Spitzer, Jr., Theoretical Research on Interactions of Light Elements.

Puerto Rico, University of. A. Cobas, Low Latitude Cosmic Ray Studies.

Puerto Rico, University of. L. Del Rosario, Meson Studies at Low Altitudes.[2]

Purdue University. F. F. Rieke, Construction of 8 Mev Linear Electron Accelerator.

Purdue University. E. Bleuler, Inelastic Nuclear Scattering.

Purdue University. R. O. Haxby, High Energy Gamma Ray Scattering.

Reed College. K. E. Davis, Investigation of K and L Capture X-Radiation from Radioactive Nuclei.

Rensselaer Polytechnic Institute. G. N. Glascoe, High Speed Coincidence Circuits and Beta-Ray Spectrometry.

Rice Institute. T. W. Bonner, Nuclear Physics of the Light Elements.

Rochester, University of. R. Marshak, High Energy Meson Physics.

Rutgers University. C. A. Whitmer, Nuclear Moments.[3]

Stanford University. F. Bloch, Nuclear Moments.[3]

Stanford University. E. L. Ginzton, Billion Volt Electron Reactions.[3]

Syracuse, University of. K. Sitte, Penetrating Radiation from Cosmic Rays.

Texas, University of. E. L. Hudspeth, Nuclear Energy Level Studies.

Vanderbilt University. S. K. Haynes, Beta and Gamma Ray Spectroscopy.

Vanderbilt University. D. L. Hill, Neutron Spectroscopy with Specific Ionization Techniques.

Washington State College. R. M. Brown, Nuclear Magnetic Resonance in Liquid Solutions.

Washington University. A. L. Hughes, Nuclear Structure and Shell Structure.[3]

Washington University. R. D. Sard, Meson Production and Disintegration.[3]

Washington, University of. J. H. Manley, Meson Momenta and Positive Excess.[3]

Washington, University of. J. H. Manley, Studies of Proton Scattering by Nuclei.

Washington, University of. P. M. Higgs, Construction of a Cryostat.

Wisconsin, University of. R. G. Herb, Precision Energy Level Determination.

Wisconsin, University of. R. G. Sachs, Theory of Light Nuclei.

Wisconsin, University of. J. R. Dillinger and C. K. McLane, Low Temperature Physics.

Wyoming, University of. C. A. Cinnamon, Measurement of Relaxation Times of Nuclei.

Yale University. R. V. Adams, Atmospheric Showers.[2]

Yale University. G. Breit, Theory of Nuclear Structure.[3]

Yale University. E. C. Pollard, Energy Levels, High Speed Counting Techniques.[4]

Yale University. W. W. Watson, Isotope Separation and Related Topics.

[3] Contract administered through Office of Naval Research, Washington, D. C.

Mathematics

Kenyon College. O. M. Nikodym, Studies in Boolean Theory.

BIOLOGY, BIOPHYSICS AND MEDICINE RESEARCH CONTRACTS

Biology

Agriculture, Department of. B. Winton, Study of the Effects of Radiation on Reproduction in Chickens.

Agriculture, Department of. H. R. Bird, Embryonic Metabolism and Internal Radiation.

Agriculture, Department of. A. H. Moseman, The Improvement of Soil Management and Crop Production Through Investigations With Isotopes.

American Meat Institute Foundation, Chicago, Illinois. B. S. Schweigert, Relation of Vitamin B_{12} to Nucleic Acid Metabolism.

Amherst College. P. T. Ives, Research in Radiobiology and Biochemical Genetics Using Radioactive Isotopes.

Amherst College. G. W. Kidder, Studies on Nucleic Acid and Free Nucleotide Synthesis in Normal Tissue and in Tumor Tissue, Using C–14.

Arizona, University of. W. H. Fuller and W. T. McGeorge, Utilization of Radioactive Phosphorus from Biological Material and Uptake of Strontium by Various Type Crops.

Arkansas, University of. I. Meschan and E. Kerekes, Utilization of Cobalt–60 as a Radium Substitute.

Arkansas, University of. J. M. Siegel, Investigation of Intermediary Metabolism of the Photosynthetic Bacteria.

Battelle Memorial Institute. K. S. Chester, The Nutrition of Obligate Parasites in Plants.

Battelle Memorial Institute. K. S. Chester, Study of Mode of Action of Fungicides.

Boyce Thompson Institute, Yonkers, N. Y. G. L. McNew, Use of Tracer Labelled Fungicides in Determining the Mechanics of Protecting Plants from Fungus Diseases.

Boston University School of Medicine. W. C. Boyd, Blood-Group-Specific Hemagglutinins From Plant Sources.

Brown University. J. W. Wilson, The Role of the Intestinal Flora in Radiation Injury.

California Institute of Technology. H. Borsook, Biological Synthesis of Protein with Use of Isotopes.[3]

California Institute of Technology. G. W. Beadle, The Genetic and Cytological Effects of High Energy Radiation.[3]

California, University of. H. A. Barker, W. Z. Hassid, and C. C. Delwiche, Tracer and Enzymatic Studies on the Metabolism of Plants and Bacteria.

California, University of. A. S. Crafts, The Use of Radioactive Isotopes and Other Indicators to Study Absorption and Distribution of Herbicidal Chemicals in Plants.

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[3] Contract administered through Office of Naval Research, Washington, D. C.

California, University of. G. H. Hart, The Effect of Radiation on Work Capacity and Longevity of the Dog.

California, University of. P. R. Stout, Micronutrient Element Nutrition of Plants as Determined by Essential and Non-Essential Soil Borne Heavy Metals of Importance in Plant Nutrition.

California, University of. L. Jacobson and R. Overstreet, Study of the Internal or Metabolic Factors and the External or Environmental Factors Influencing Ion Absorption by Plants.

California, University of. M. Kleiber, Intermediary Metabolism of Organic Compounds and Biological Synthesis in Farm Animals.

California, University of. F. M. Turrell, et al., Use of Radioactive Tracers in Studies of the Mode of Action of Organic Insecticides.

California, University of, at Los Angeles. T. A. Geissman, The Sites and Mechanisms of Action of Physiologically-Active Substances, with Particular Application to Drugs upon the Autonomic Nervous System.

California, University of, at Los Angeles. S. G. Wildman, The Study of Plant Virus as Approached by the Study of the Normal Plant Proteins.

Chicago, University of. H. Gaffron, Effect of Blue and Dark Red Light Upon Reactivation of Ultraviolet Treated Photosynthetic Microorganisms.

Chicago, University of. E. M. K. Geiling, Biosynthesis of Radioactive Drug Compounds.

Clemson Agricultural College. J. G. Dinwiddie, Jr., Investigation of Action of Maleic Hydrazide as a Plant Growth Regulator.

Columbia University. T. Dobzhansky, The Population Genetics of Species of Drosophila.

Columbia University. C. G. King and H. B. Burch, To Identify Precursors and End-Products Containing Radio-Carbon, in Studies of the Role of Glucose, Ascorbic Acid, etc., in Metabolism.

Columbia University. J. H. Taylor, Nucleic Acid and Protein Synthesis in Individual Cells and Chromosomes Studied by Radioactive Tracers and Autoradiographs.

Connecticut Agricultural Experiment Station. J. G. Horsfall and A. E. Dimond, Therapy of Plant Disease by Nuclear Radiations.

Cornell University. M. R. Zelle, Cytological and Genetic Studies of Bacteria as Related to Effects of Radiation.

Delaware, University of. A. M. Clark, Radiation Effects upon Haploids and Diploids of Habrobracon.

Duke University. I. E. Gray, A) Studies on Synthetic Potentialities of Liver Nuclei *in vitro*; B) Shell Formation in Mollusks as Studied by Radioisotopes.

Duke University. P. J. Kramer, Study of the Factors Affecting the Absorption of Radioactive Phosphorus by Mycorrhizal and Non-Mycorrhizal Roots of Pine.

Emory W. Thurston Laboratories, Los Angeles, Calif. B. H. Ershoff, Comparative Effects of the Known B Vitamins and an Unidentified Antitoxic Factor in Liver on Radiation Injury in the Rat.

Emory University. A. V. Beatty, Studies of the Influence of Oxygen Level and Temperature on the Effects of Ionizing Radiation.

Florida, University of. G. K. Davis, J. P. Feaster, and A. M. Pearson, Concentration of Mineral Elements in the Fetus and the Relationship to Placental Transfer of these Elements.

Fordham University. F. F. Nord, Investigation on Enzymatic Degradation of Native and Chemically Modified Proteins.

Fordham University. E. V. Brown, Fate of Thiamine and Thiamine Analogs in the Animal Body. Mechanism of Thiamine Inhibition by Thiamine Analogs.

Georgia, University of. E. P. Odum and J. J. Paul, An Ecological Study of Land-Use, Succession, and Indicator Invertebrate and Warm-Blooded Vertebrate Populations of the Savannah River Operations Areas.

Harris Research Laboratories, Washington, D. C. M. Harris, The Chemistry of Biosynthesized Isotopically Labelled Cellulose and Allied Polysaccarides.

Harvard University. K. Sax, Intensity of Radiation and Chromosome Breakage.[3]

Howard University. L. A. Hansborough, The Effect of Labelling the Germ Cells on Fertilization and Development.

Idaho, University of. W. K. Ferrell, and E. E. Hubert, A Study of Absorption and Translocation of Mineral Elements in Diseased and Healthy Western White Pine by the Use of Radioactive Materials.

Illinois, University of. R. G. Hansen, Utilization of Carbon-14 in Studies of the Metabolism of Lactose.

Illinois, University of. I. C. Gunsalus, Metabolic Pathways in Microorganisms.

Illinois, University of. R. C. Johnson, Nutritional Biochemistry on the Metabolism of Vitamins and Amino Acids.

Illinois, University of. H. H. Mitchell, Content in Human Tissues of Eleven Trace Elements.

Indiana University. T. M. Sonneborn, Specific Immobilization Substances (Antigens) of *Paramecium Aurelia.*

Indiana University. W. J. van Wagtendonk and W. A. Michison, Immunochemistry of *Paramecium Aurelia.*

Indiana University Foundation. F. Haurowitz, The Mechanism of the Combination of Antigen and Antibody.

Indiana University Foundation. H. J. Muller, The Influence of Radiation in Altering the Incidence of Mutations in Drosophila.

Interior, Department of. W. A. Chipman, Survey of the Accumulation of Radioactivity in Marine Invertebrate Animals.

Iowa State College. S. Arnoff, Metabolism and Physiology of Roots.

Iowa State College. L. A. Underkofler, Combined Biochemical and Physiological Action of Tyrosine and Vitamin B_{12}.

Iowa State College. C. H. Werkman, Synthesis and Dissimilation of Bacterial Nucleic Acids.

Iowa State College. J. W. Gowen and J. Stadler, Quantitative Study of Lifetime Sickness and Mortality and Progeny Effects Resulting from Exposure of Animals to Penetrating Irradiation.

Iowa State College. F. Schlenk, Nucleic Acid Metabolism.

Johns Hopkins University. R. Ballentine and W. D. McElroy, Metabolism and Functional Significance of Cobalto-Protein.

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[3] Contract administered through Office of Naval Research, Washington, D. C.

Johns Hopkins University. B. F. Chow, Purification of Intrinsic Factor in Gastric Juice.

Johns Hopkins University. T. Enns, A Study of Relative Diffusion Rates of Isotopes From Capillaries.

Johns Hopkins University. C. P. Richter, Part Played by the Adrenals in the Ability of Rats to Withstand Radiation Effects.

Johns Hopkins University. R. M. Herriott, (A) The Transformation of E. Coli B From Virus Sensitive to Virus Resistant or Vice Versa; (B) Chemical and Nutritional Studies of Bacterial Viruses.

Johns Hopkins University. W. D. McElroy and C. P. Swanson, Modification through the Use of Supplemental Environmental Factors of the Frequency of Gene and Chromosome Changes Induced by X-rays, Ultra-Violet Light and Nitrogen Mustard.

Kansas State College of Agriculture and Applied Science. P. A. Dahm, An Autoradiographic Study of the Distribution of Radioisotope Labelled Synthetic Organic Insecticides in Relation to Insecticidal Resistance to These Compounds by the House Fly.

Kansas, University of. C. A. Leone and A. B. Leonard, Radium Chloride and Hemopoietic Physiology of Rodents.

Kentucky, University of. H. P. Riley, The Protective Effect of Certain Chemicals on the Sensitivity of Plant Chromosomes to Ionizing Radiation.

Long Island Biological Association, Inc. B. Wallace, Adaptive Value of Experimental Populations Exposed to Radiations.

Louisiana State A. & M. College. N. J. Bennett, The Effects of Radioisotopes on the Developmental Stages of Trematodes.

Louisiana State University and A. & M. College. J. F. Christman and V. Williams, The Effect of Biotin on Acetate Utilization and Lipide Synthesis by Microorganisms.

Louisiana State University. H. E. Wheeler, Investigations of the Physiology, Genetics, and Host-Parasite Relationships of Plant Pathogenic Fungi by the Use of Radioisotopes.

Marine Biological Laboratory, Woods Hole, Mass. P. B. Armstrong, Studies on the Physiology of Marine Organisms Using Radioisotopes.

Maryland, University of. J. C. Shaw, The Metabolism of Acetate, B-Hydro-Oxybutric Acid, Glucose, and Other Carbon Compounds in Lactating Ruminants.

Maryland, University of. E. Steers, The Nature and Function of the Replacement of P-Amino-Benzoic Acid by D-Lysine as a Growth Factor for *Lactobacillus Arabinosus* 17–5.

Massachusetts, University of. P. A. Swenson, Effects of Ultraviolet Radiations on Phosphate Turnover of Yeast Cells in the Presence of Galactose.

Michigan State College. R. U. Byerrum and C. D. Ball, A Study of Transmethylation Using Cargon 14.

Michigan State College. B. Kawin, The Metabolism in Animals of Some Radionuclides Derived from Fission.

Michigan State College. H. B. Tukey, The Absorption and Utilization of Radioactive Minerals Applied to the Leaves of Plants.

Michigan State College. L. F. Wolterink and E. P. Reineke, Hormonal and Nutritional Factors which Alter Biological Half Lives and Differential Absorption Ratios of Calcium, Manganese and Strontium in the Animal Body.

Michigan, University of. C. L. Markert, Mutagenic Effects of Different Types of Radiation.

Michigan, University of. J. V. Neel, The Estimation of the Rate of Mutation of Certain Human Genes.

Minnesota, University of. W. E. Peterson *et al.*, Study of Milk Formation by the Use of Radioactive Carbon Compounds.

Minnesota, University of. R. T. Holman, Studies in Lipid Metabolism by Means of Radioactive Tracers.

Minnesota, University of. E. C. Stakman, Effects of Radioactive Substances on Plant Pathogens and Other Micro-organisms.

Missouri, University of. S. Brody, Determination of Thyroid Activity in Farm Animals by the Use of Radioactive Tracers.

Missouri, University of. J. Levitt, Translocation of Mineral Substances in Plants.

Missouri, University of. L. J. Stadler, The Genetic Nature of Induced Mutations.

Nebraska, University of. E. F. Frolik and R. Morris, The Genetic Effects of Thermal Neutron Irradiation of Crop Seeds.

North Carolina State College. W. C. Gregory, Effects of Nuclear Reactor Radiation upon Genetic and Physiological Characteristics of Peanuts.

North Carolina State College. N. S. Hall, Study of the Movement of Ions Through Soil Systems.

North Carolina State College. D. B. Anderson, Investigation of the Rate of Movement of Organic and Inorganic Compounds in the Tissues of Intact Tree Species.

North Carolina State College. D. S. Grosch, The Genetic and Developmental Effects of Ingested Radioisotopes.

North Carolina State College. S. B. Tove, A Study of the Effect of the Diet on Lipid Metabolism Using C–14.

North Carolina, University of. D. P. Costello, The Effects of Radiations of Specific Energies on Mitosis.

North Carolina, University of. M. Whittinghill, The Partial Elimination of Lethal Genes Before Reproduction in Drosophilia by the Use of Environmental Agents.

Notre Dame, University of. C. S. Bachofer, Study of Protection of Virus Systems Against Irradiation.

Oberlin College. G. T. Scott, Studies on the Physiology of Ion Accumulation and Electrolyte Balance in Living Cells.

Ohio Agricultural Experiment Station. T. Kommedahl, The Physiology and Genetics of Plant Pathogenic Micro-organisms When Grown in the Presence of Various Radioisotopes.

Oklahoma A. & M. College. R. M. Chatters, Effects of Radiation on Plant Growth.

Oklahoma A. & M. College. R. MacVicar, Isotope Investigation of the Mechanism of Nitrate Reduction in Bacteria.

Oklahoma Research Institute, University of. R. W. Goff, Study of the Effects of Isotopic Irradiation on Embryonic Capillaries.

Oklahoma Research Institute, University of. L. Rohrbaugh and E. L. Rice, Study of the Translocation of Tagged 2, 4–D and other Growth Regulators in Plants in Light and Darkness.

Oregon State College. J. M. Butts, The Mode of Action of Labelled 2, 4-Dichlorophenoxyacetic Acid and Isopropyl N-Phenyl Carbamate.

Oregon State College. V. H. Cheldelin and B. E. Christensen, Vitamin-Amino Acid and Carbohydrate-Amino Acid Interrelationships, Using Isotopic Tracers.

Oregon, University of. F. J. Reithel, An Investigation of Lactose Synthesis in Mammary Gland Homogenates.

Pennsylvania, University of. E. D. DeLamater, Studies on the Cytology and Cytochemistry of Micro-organisms.

Pennsylvania, University of. S. Mudd, The Internal Organization of Normal and Phage-Infected Bacterial Cells, with Especial Reference to Activation of Latent Phage Infection by Ultraviolet Radiation.

Pittsburgh, University of. R. Buchsbaum, The Study of Normal and Virus-Infected Living Cells in Tissue Culture in Perfusion Chambers Before, During and After Radiation.

Pennsylvania, University of. D. Wright Wilson, Synthesis of Isotopic Carbon Compounds Used in Biochemistry.

Pittsburgh, University of. M. A. Lauffer, Study of the Correlation of Radiation Effects with Physical and Chemical Changes in Viruses.

Purdue University. H. Koffler, Use of Radioactive Isotopes in Studying Metabolism in Penicillium Chrysogenum and Other Molds.

Purdue Research Foundation. H. Koffler and D. M. Powelson, The Physiology of Hydrogen Bacteria.

Reed College. F. P. Hungate, The Application of the Radioactive Tracer Technique in the Field of Cellular Metabolism.

Reed College. A. H. Livermore, The Biochemical Synthesis of Peptide Bonds.

Reed College. A. F. Scott and A. H. Livermore, The Effect of Ionizing Radiation on Biochemical Compounds.

Rice Institute. A. C. Chandler and R. V. Talmage, Physiological Action of Relaxin and Related Studies on Cellular Metabolism.

Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine. E. S. Russell and W. S. Murray, The Maintenance of a Genetically Controlled Colony of Mice to Insure the Availability of Strains of Known Constitution to AEC Institutions and Contractors.

Rutgers University. J. E. Gunckel, Histological and Physiological Effects of Irradiation on *Tradescantia Paludosa.*

Rutgers University. H. H. Haskin, Distribution and Accumulation of Radioisotopes of Physiological Importance in Shellfish.

Smith College, A. F. Blakeslee, Studies on Effects on Neutron Radiation on Chromosome and Gene Changes in Datura.

Smithsonian Institution. R. B. Withrow, A Biochemical Investigation of Radiant Energy as it Affects Photomaturation in Green Plants.

South Carolina, University of. W. E. Hoy, An Ecological Study of the Land Plants and Cold-Blooded Vertebrates of the Savannah River Project Area Before and After Installations Have Been Completed.

South Dakota State College. E. I. Whitehead and O. E. Olson, Metabolism of Selenium and Radioactive Sulfur in Plants.

Southern California, University of. H. J. Deuel and A. L. S. Cheng, Effects of Radiation on Intestinal Absorption and Metabolism of Fats and Carbohydrates.

Southern Illinois University. C. C. Lindgren, The Effects of X-Radiation on a Polypoid Series of Yeast Cultures Containing Determined Amounts of DNA.

Southern Research Institute. H. E. Skipper, Study of Dosages of C–14 Labelled Sodium Formate Required To Produce Radiation Effects.

Southern Research Institute. H. E. Skipper and L. L. Bennett, Jr., Use of Radioactive Isotopes for Study of Certain Chromosome-Coenzyme Relationships.

Stanford Research Institute. R. Pencharz and D. Singman, Experimental Study of the Direct and Indirect Effects Produced by X-Irradiation of the Spleen.

Stanford University. A. C. Giese, Studies on Photoreactivation Following Ultraviolet Irradiation Injury.

Syracuse University. J. Lein, The Study of Intermediate Carbohydrate Metabolism in Neurospora Using Radioactive Carbon and Biochemical Mutants.

Tennessee Agricultural and Industrial State College. H. B. Crouch, Radiation and Tracer Element Studies on Certain Pathogenic Protozoa and Nematodes of Rodents.

Texas A. & M. College. J. H. Quisenberry, Effects of X-ray Irradiation on Reproduction of the Domestic Fowl (Gallus Domesticus).

Texas, University of. J. W. Foster, Metabolic Processes in Molds and Fungi.

Texas, University of. J. Myers, Study of the Relationships of Algae to the Disposal of Radioactive Wastes.

Texas, University of. W. S. Stone, Research on Direct and Indirect Effects of Radiations on the Genetic Systems of Organisms.

Union College. L. B. Clark and G. Heidenthal, I—Biological Effects of High Voltage Radiation; II—Radiation Genetics of Habrobracon.

Utah State Agriculture College. C. Biddulph, Use of Radioisotopes in the Study of Reproduction.

Utah State Agriculture College. D. W. Thorne, Use of Radioiron in Studying Lime-Induced Chlorosis.

Utah, University of. L. P. Gebhardt and L. T. Samuels, Use of Labelled Phosphorus in the Study of Nerve Tissue Metabolism During Invasion of Neurotropic Viruses.

Utah, University of. J. D. Spikes and R. W. Lumry, Studies of Photosynthetic Processes in Cell-Free Preparations Using Radiation.

Virginia Polytechnic Institute. E. P. Johnson, Radioactive Isotopes to Trace Leucosis and Newcastle Disease in Fowls.

Washington, State College of. N. Higinbothan, The Rate of Movement of Ions Into and Through Parenchma Tissue as Affected by Rate of Water Uptake.

Washington, State College of. H. Bayard Milne, The Effect of X-rays Upon the Optical Specificity of Papain.

Washington, State College of. O. Biddulph. Absorption, Translocation and Deposition of Radioactive Elements in Plants.

Washington, State College of. O. Biddulph, The Zinc Nutrition of Plants in Calcareous Soils.

Washington, State College of. L. Smith, A Study of Factors Influencing the Biological Effects of X-rays.

Western Reserve University. H. G. Wood and L. O. Krampitz, Intermediary Metabolism of Carbohydrates by Bacteria.

Wisconsin, University of. R. H. Burris, M. J. Johnson and P. W. Wilson, Metabolism of Organic Acids in Higher Plants and Micro-organisms.

Wisconsin, University of. R. H. Burris, and P. W. Wilson, Biological Nitrogen Fixation with Isotope Tracers.

Wisconsin, University of. D. E. Green, Effects of Radiation on Enzymes in the Cyclophorase.

Wisconsin, University of. A. J. Riker and J. E. Kuntz, The Use of Radioactive Isotopes in Determining the Role of Root-Grafting in Forest Trees.

Wisconsin, University of. P. H. Phillips, Long Time Effects of Intermittent Radiation on Dogs.

Wisconsin, University of. J. Lederberg, Cytogenetic Effects of Radiations on Bacteria.

Wyoming, University of. I. Rosenfeld and O. A. Beath, Investigations of the Interrelationship of Sulfur, Phosphorus and Calcium in Selenium Metabolism in Plants and Animals.

Yale University. D. M. Bonner, Relationship of Genes to Biochemical Reactions in Neurospora.

Yale University. M. I. Bunting, The Genetics of Serratia as Revealed by Radiation.

Yale University. N. H. Giles, Jr., Investigations on the Mechanism of Radiation-Induced Chromosomal Rearrangements in Tradescantia and Gene Mutations in Neurospora.

Yale University. E. C. Pollard, Irradiation of Viruses and Large Molecules.

Biophysics

Chicago, University of. R. E. Zirkle, Use of Microbeam of Light Atomic Nuclei for Biological Investigations.

Columbia University. G. Failla, (1) Instrumentation for Dosimetry of Ionizing Radiation, (2) Study of the Biological Effects of Ionizing Radiation.

Commerce, Department of, National Bureau of Standards. L. S. Taylor, Radiation Physics as Related to Dosimetry and Radiation Protection.

Commerce, Department of, United States Weather Bureau. F. W. Reichelderfer and H. Wexler, Correlation of Meteorological Trajectories with Fallout of Atomic Debris.

Federal Security Agency, Public Health Service. R. L. Cleere, Investigation of Radon and Radon Decay Products in the Uranium Mines of Colorado.

Florida, University of. D. Pomeroy and A. A. Bless, Study of Bioelectric Potentials as a Measure of Radiation Injury to Plants and Animals.

Howard University. H. Branson, Kinetic and Mass Spectrometric Studies of Biophysical Systems with Radioactive and Stable Isotopes.

Idaho State College. C. W. McIntosh and A. E. Taylor, Determination of Quantities of Certain Radioactive Materials in Ground Water and Soil of Areas in and Adjacent to the Reactor Testing Station.

Illinois, University of. G. A. Bennett and R. A. Harvey, Distribution and Effect of Radioactive Calcium and Strontium in Bone Development.

Marquette University. W. A. D. Anderson, The Pathological Effects of Radioactive Isotopes of Calcium and Strontium on Bone and Soft Tissue.

Massachusetts Institute of Technology. R. D. Evans, Radium and Mesothorium Poisoning, and Dosimetry and Instrumentation Techniques in Applied Radioactivity.

Michigan, University of. H. J. Gomberg, High Resolution Detection of Radioactive Isotopes.

New York University. M. B. Sulzberger and V. H. Whitten, Effects of Thorium-X in Selected Vehicles Applied to the Skin of Man, and the Effects of Selected Pure Beta Emitters on the Skin of Man.

Northwestern University. E. L. Hess, The Separation of the Proteins of Lymphoid Tissue and their Characterization as Regards Radiation Sensitivity.

Oregon, University of. F. B. Queen, Evaluation of Body Content of Radium in Individuals with No Known Exposure.

Pittsburgh, University of. A. J. Kammer and T. F. Hatch, Hazard from Inhaled Particulate Matter.

Utah, University of. J. Z. Bowers, Toxicity Studies of Plutonium and Other Radioactive Substances in Animals.

Vanderbilt University. J. I. Hopkins, Elementary Particle Scattering and Studies of Decay Schemes.

Washington University. W. M. Allen, W. B. Seaman, and M. T. Ter-Pogossian, Comparative Study of the Biological Effects of X-rays and Ionizing Radiation from Radioisotopes.

Washington University. H. G. Schwartz, W. B. Seaman and M. Ter-Pogossian, Study of Alteration in the Blood-Brain-Barrier Associated with Pathological Conditions of the Central Nervous System.

Washington, University of. P. E. Church, Changes of Wind Speed and Direction with Height in Relation to the Vertical Temperature Distribution.

Washington, University of. P. E. Church and R. G. Fleagle, Determination of Relationships Between Temperature Lapse Rate, Wind Speed, and Wind Shear.

Wisconsin, University of. D. M. Angevine and J. J. Lalich, Development and Application of Historadiography in Relation to the Distribution of Mass and Localization of Elements in Normal and Pathologic Tissues.

Medicine

Arkansas, University of. P. L. Day, J. R. Totter, J. S. Dinning and I. Meschan, Studies on the Biochemical and Nutritional Aspects of X-radiation Injury.

Beth Israel Hospital Association, Boston, Mass. H. Blumgart, The Use of I-131 in Treatment of Heart Diseases and Follow-up Studies on Biological Effects of Radiation.

Boston University School of Medicine. W. W. Jetter, The Effects of Sublethal Doses of Ionizing Radiation on Physical Performance of Dogs. Related Biochemical and Pathological Studies.

Boston University. L. C. Wyman, The Effects of Irradiation on the Growth and Functioning of Transplanted or Regenerated Adrenocortical Tissue in the Rat.

Boston University. B. R. Lutz, The Effects of Irradiation on the Functions of Small Blood Vessels of the Hamster and the Frog.

California, University of, San Francisco, Calif. H. Becks, Investigations of the Dietary Effects of Radioactive Strontium, Calcium and Phosphorus. (Dental).

California, University of, Berkeley, Calif. I. L. Chaikoff, Studies on the Induction of Thyroid Cancer Following Administration of Radioactive Iodine.

Chicago, University of. C. P. Miller, Bacteriological Aspects of Radiation Sickness.

Chicago, University of. H. S. Anker, Investigation of the Mechanism of Antibody Synthesis by the Tracer Technique.

Chicago, University of. E. S. G. Barron, Studies on the Mechanism of Action of Ionizing Radiations.

Chicago, University of. P. P. H. DeBruyn, Radiosensitivity of the Lymphocyte.

Chicago Medical School. P. Shubik, A Study of the Latent Tumor Cells as Produced by Beta Radiation and a Comparison of the Latent Tumor State with that Produced by Chemical Carcinogens.

Chicago, University of. W. L. Palmer, A Study of the Effects on Gastric Tissues of Irradiation Therapy in Peptic Ulcer.

Chicago, University of. W. H. Taliaferro, The Effect of Localized X-Irradiation on Antibody Formation and Antigen Localization. The Site of Antibody Formation.

Children's Hospital, Boston, Mass. L. K. Diamond, Study of the Possible Factors in Regeneration of Hematopoietic Tissue in the Aplastic Anemia, Both Idiopathic and Secondary to Radiation Injury, in Human Subjects.

Children's Hospital of Buffalo. C. U. Lowe, Nucleic Acid Metabolism in the Liver and Effects of Radiation.

Children's Medical Center, Boston, Mass. S. Farber and E. S. Buckley, Jr., The Nature of Bleeding in Pancytopenia with Special Regard for Thrombocytopenia and the Vascular Defect.

Cincinnati, University of. R. C. Crafts, The Hypophysis and Iron Metabolism.[1]

Cincinnati, University of. R. A. Kehoe, F. R. Dutra, and E. J. Largent, Research on the Biological Effects of Beryllium and Its Compounds.

Colorado, University of. J. D. Park, Research on the Infra-Red Absorption Spectra of Nucleic Acids, Amino Acids, and Related Compounds.

Colorado, University of. T. Puck, Bacteriophage and Radiation Mechanisms.

Columbia University. H. Grundfest and D. Nachmansohn, Study of Changes in Permeability of Normal, Poisoned and Irradiated Nerve Fibers.

Columbia University. A. Gorbman, Biological Effects of Radiation from Excessive Amounts of Radioiodine.

Columbia University College of Physicians and Surgeons. P. B. Hudson and J. M. Reiner, The Turnover of Specific Proteins, Protein Fractions, and Nucleic Acids in Normal and Malignant Human Testis and Kidney.

Columbia University. D. Nachmansohn, Effect of Exposure to Radioactive Material and to X-ray Irradiation on Nerve Tissue.

Cornell University Medical College. H. G. Wolff, Effect of Adrenocorticotrophic Hormone, Cortisone, and Other Steroid Hormones on Phospholipid Metabolism.

Creedmore Institute for Psychobiologic Studies, New York, N. Y. C. Tui, Investigations on the Relationship of Human Skin Types to Blood Types and Related Studies in the Mechanism of Thermal Injury.

Duke University. P. Handler, (A) Localization of Brain Tumors Using Positron-Emitting Isotopes; (B) Renal Function and Metabolism.

Duke University. J. S. Harris, A Study of Potassium in Isolated Tissue.

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[1] Contract administered through Office of Naval Research, Washington, D. C.

Duke University School of Medicine. R. W. Rundles, Study of the Metabolism of the Human Bone Marrow.

Emory University. H. W. Ades, (A) Effect of Radiation on Learned Behavior, Problem Solving Ability and Neural Mechanisms of Rhesus Monkeys; (B) Effect of Radiation on Ground Substance of Loose Connective Tissue.

Florida, University of. F. E. Ray, The Use of Isotopes in the Study of the Metabolism of Aromatic Amines.

Georgetown University. C. F. Geschickter, A Study of the Redistribution of Bivalent Metallic Ions in the Bone Metabolism and in Bone Disease and Neoplasms through the Use of Radioisotopes and Novel Chelating Compounds.

George Washington University. P. K. Smith and E. L. Alpen, Studies of the Effects of Radiation on the Biosynthesis and Degradation of Nucleoproteins and its Modification by Various Agents.

Georgia, University of. S. A. Singal, The Effects of Nutritional Deficiencies on the Synthesis of Phospholipids and Nucleoproteins in the Rat.

Hahnemann Medical College and Hospital. J. S. Roth and M. J. Boyd, A Study of Nutritional and Other Factors Involved in Radiation Injury and Resistance to Radiation Injury.

Harvard University. A. K. Solomon, Use of Isotopes on Medical Problems.

Harvard University. A. B. Hastings, Use of Isotopes in Study of Metabolism of Organic Substances in Mammalian Tissue.

Harvard University. J. C. Aub, Study of Metabolic Activities of Living Organisms by Means of Suitable Isotopes.

Harvard University. D. G. Cogan and R. D. Evans, Production of Cataracts by Neutrons and Other Radiations.

Harvard University, Bussey Institution of. J. L. Tullis, (1) Investigation of Factors Regulating the Formation, Maturation, and Liberation of Formed Blood Elements from Bone Marrow; (2) Further Studies of the Separation and Utilization of Formed Blood Elements.

Harvard University, Pondville Hospital. S. P. Hicks, The Effects of Ionizing Radiations on the Developing Mammalian Nervous System.

Harvard University. R. F. Sognnaes and J. H. Shaw, Metabolism of the Teeth.

Haskins Laboratories, Inc. P. H. Hutner and S. A. Zahl, The Microbiological Assay of Nucleic Acid Constituents Produced by Radiation Injury.

Jefferson Medical College of Philadelphia. F. W. Sunderman, Metabolic and Cytologic Changes Induced by Metallic Carbonyls.

Illinois, University of. A. C. Ivy, Effects of Radiation of the Gastric Mucosa.

Institute for Cancer Research, Philadelphia, Pennsylvania. S. Weinhouse and G. Medes, Origin and Fate of Amino Acids in Plants and Animals.

Iowa State, University of. T. C. Evans and P. J. Leinfelder, A Quantitative and Morphologic Study of Radiation Induced Cataracts.

Johns Hopkins University. J. S. Friedenwald, Enzymatic Histochemistry of the Ocular Lens.

Johns Hopkins University. J. E. Howard, Investigation of the Mechanism of Bone Deposition and Related Physiological Studies.

Johns Hopkins University School of Medicine. C. L. Conley, (a) Studies of the Absorption, Utilization, and Excretion of Vitamin B–12, Using B–12 Containing Radioactive Cobalt (Co^{60}); (b) Synthesis of Compounds with Vitamin K Activity Labeled with Radioactive Carbon (C^{14}) for Use in Tracer Studies with Vitamin K.

Johns Hopkins University. T. G. Ward, Metabolism of Phosphorus in Virus-Host Systems.

Kansas, University of. R. E. Stowell, Cytochemical, Microchemical and Biophysical Studies of Tumors and Effects of Radiation upon Cells.

Kresge Eye Institute, Detroit, Michigan. V. E. Kinsey, Effects of Neutrons and Other Radiations on the Ocular Lens.

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. W. R. Lovelace, et al., Indirect Blast Injuries.

Maryland, University of. T. E. Woodward, Studies on Monkeys Following Exposure to Large Doses of Total Body Irradiation.

Massachusetts General Hospital. S. Cobb, Effect of Radiation on Learned Skill and Judgment.

Massachusetts General Hospital. W. H. Sweet, The Use of Thermal and Epithermal Neutrons in the Treatment of Neoplasms.

Massachusetts General Hospital. A. Forbes and E. L. Gasteiger, The Effects of Ionizing Radiation on Peripheral Nerve.

Massachusetts General Hospital. W. H. Sweet, External Localization of Brain Tumors Employing Positron Emitting Isotopes.

Massachusetts General Hospital. J. C. Aub, I. T. Nathanson and P. C. Zamecnik, A Biochemical Study of the Effects of Radiation on Cells.

Massachusetts General Hospital. H. L. Hardy, Establishment of a Beryllium Case Registry.

Massachusetts General Hospital. O. Cope, Effects of Radioactive Iodine on Biology of Thyroid Gland.

Massachusetts Memorial Hospitals. J. F. Ross, Physiological and Therapeutic Investigations and Fundamental Blood Studies Using Radioactive Isotopes.

Massachusetts Memorial Hospitals. F. J. Ingelfinger, Effects of Radiation on the Structure and Function of the Digestive System, Particularly the Gastro-Intestinal Tract in Man.

Meharry Medical College. P. F. Hahn, Use of Radioactive Gold in Treatment of Tumors.

Michigan, University of. F. H. Bethell, Hematological and Biochemical Effects of Ionizing Radiation.

Minnesota, University of. W. D. Armstrong, Effect of Ionizing Radiations on Electrolyte and Water Metabolism.

Minnesota, University of. G. E. Moore, F. J. Lewis, J. F. Marvin, and C. W. Lillehei, Toxic Effects of Irradiation.

Minnesota, University of. G. E. Moore, Studies in Methods and Instruments to Improve the Localization of Radioactive Materials in the Body with Special Reference to the Diagnosis of Brain Tumors, and the Use of Ultrasonic Techniques.

Minnesota, University of. S. Schwartz, Synthesis of Hemoglobin in Bone Marrow and Maturation and Multiplication of Blood Cells.

Minnesota, University of. C. J. Watson, The Influence of Radiation and Chemically-Induced Bone Marrow Injury upon Porphyrin Metabolism.

Montefiore Hospital for Chronic Diseases. D. Laszlo, K. G. Stern, The Relationship of Stable and Radioactive Lanthanum to Nucleic Acid Synthesis in Normal and Neoplastic Tissue.

Mount Sinai Hospital. H. Sobotka, The Use of Isotopes in the Study of the Etiology of Drug Eruptions.

National Institutes of Health, National Cancer Institute. E. Lorenz, Research on the Physiological Effects of Ionizing Radiations.

New England Center Hospital. W. Dameshek and M. Stefanini, Physio-pathology of Platelets and Development of Platelet Substitutes.

New England Deaconess Hospital. S. P. Hicks, et al, Acute and Chronic Radiation Injury.

New York Medical College. A. L. Copley, Study of Vascular Factors in Radiation Hemorrhage and Other Hemorrhagic Diatheses in Patients and Experimental Animals.

New York University. A. Goldfeder, Studies on the Nature of, and Protection from Radiation Injury.

New York University. N. Nelson, Influence of Particle Size on the Retention of Mist Particles in the Human Respiratory System.

New York University. N. Nelson, Preliminary Study on Uranium Hydride Toxicity.

New York University. W. S. Tillett and R. Soberman, The Influence of Ionizing Radiation on Enzyme Systems.

New York University, Bellevue Medical Center. J. M. Converse, (1) The Effect of Refrigeration of Human and Animal Skin Upon its Use in Skin Grafts Following Thermal Injury; (2) A Study of Antibodies Produced by Homologous Skin Grafts in Animals and in Man.

New York Research Foundation, State University of, Albany, N. Y. J. H. Ferguson, and M. F. Hilfinger, Experimental Transfusion of Bone Marrow into Rabbits after Total Body Irradiation.

North Carolina, University of. A. Roe, Effect of C–14 on the Course of Certain Organic Reactions.

North Carolina, University of. C. D. Van Cleave and C. T. Kaylor, Radioautographic Study of Distribution and Retention of Beryllium in the Rat.

North Dakota, University of. W. E. Cornatzer, The Effects of Radiation on the Functional Capacity of Tissues and the Factors that may Influence their Recovery.

Northwestern University. S. Freeman, Studies on Radiation-Induced Cataracts.

Northwestern University. J. A. D. Cooper and H. L. Alt, The Diagnostic and Therapeutic Use of Radioisotopes in Experimental Medicine.

Northwestern University. L. Davis, Further Development and Utilization of Radioactive Dyes in the Diagnosis and Localization of Brain Tumors.

Northwestern University. R. W. Schayer, Studies of the Metabolism and Biogenesis of Histamine.

Notre Dame, University of. J. A. Reyniers, Study of the Effect of X-radiation on Germ-Free (GF) Rats.[3]

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[3] Contract administered through Office of Naval Research, Washington, D. C.

Ohio State University Research Foundation. J. L. Morton, Use of Radioisotopes for Cancer Therapy.

Oklahoma Medical Research Institute and Hospital, Oklahoma City, Okla. C. D. Kochakian, Radioactive Metabolism of Sex Hormones.

Oklahoma Research Institute, University of, Norman, Okla. S. H. Wender, Isolation and Identification of Flavonoid Pigments of Use in the Control of Radiation Injury.

Oregon Medical School, University of. E. E. Osgood and A. J. Seaman, The Effects of Adrenocortical Hormones upon the Cultivation and Transplantation of Human Blood Cellular Elements, and Followup Studies of Radiation Therapy Patients.

Oregon Medical School, University of. E. S. West, Studies on the Metabolism of Cholesterol and Ketone Bodies.

Peter Bent Brigham Hospital, Boston, Mass. F. D. Moore, Intracellular Changes in Trauma, Depletion and Repair; Biochemical Studies in the Human Being with the Aid of Isotopes.

Philadelphia General Hospital. H. P. Schwarz, The Effect of X-ray Radiation on the Infra Red Spectra of Neural and Radiosensitive Visceral Tissue.

Pittsburgh. University of. F. S. Cheever, The Effect of Radiation on the Virus-Host Cell Relationship.

Pittsburgh School of Medicine, University of. F. J. Dixon, The Study of the Effects of Radiation on the Immune Response with Special Reference to Factors which Increase the Radioresistance of the Immune Response.

Pittsburgh, University of. M. A. Fischer and S. E. Purvis, Mechanism of Protection Against Radiation.

Presbyterian Hospital of the City of Chicago. R. G. Gould, Studies of Cholesterol and Lipoprotein Metabolism.

Rochester, University of. L. H. Hempelman, A Program for Patient Care in Radiation Therapy.

Rochester, University of. G. H. Whipple, Plasma Proteins with Labeled Acids.[3]

Saranac Laboratory of the Trudeau Foundation, Saranac Lake, N. Y. A. J. Vorwald, Clinical Effect of Cortisone on Chronic Pulmonary Granulomatosis (Beryllium).

Saranac Laboratory of the Trudeau Foundation, Saranac Lake, N. Y. A. J. Vorwald and F. W. Klemperer, Clinical and Experimental Investigations Concerning the Biological Hazards of Beryllium.

Saranac Laboratory of the Trudeau Foundation, Saranac Lake, N. Y. L. D. Scheel, Biochemical Aspects of Pulmonary Disease in Beryllium Workers.

Sloan Kettering Institute for Cancer Research. C. P. Rhoads, Biological Effect of Radiation, and Related Biochemical and Physical Studies.

St. Louis University. H. Pinkerton, Study of the Relation of Rickettsial and Viral Infections to Radiation Injury.

St. Louis University School of Medicine. E. A. Doisy, Sr., Metabolism of Steroids Utilizing Radiocarbon Labelled Compounds.

St. Louis University School of Medicine. E. A. Smolik, The Blood Volume and Blood Turnover in Cases of Head Injury as Determined by P_{32} Labeled Red Blood Cells.

[3] Contract administered through Office of Naval Research, Washington, D. C.

Syracuse University. E. L. Lozner, Body Defenses Against Hemorrhage in Health and Disease.[3]

Temple University. R. Robbins, Investigation of the Breakdown Products of Para-Aminobenzoic Acid After Radiation with X-rays.

Tennessee, University of. E. F. Williams, Jr., Absorption and Intermediary Metabolism of Calcium.

Tennessee, University of. L. Van Middlesworth and J. P. Quigley, Thyroid Metabolism and Study of the Metabolism of Radioactive Methionine in Tissues.

Tennessee, University of. R. R. Overman and D. B. Zilversmit, Mechanisms of Ionic Imbalance and Pathophysiologic States.

Tennessee, University of. J. L. Wood, The Origin and Fate of Thiocyanate Ion in Metabolism.

Tennessee, University of. D. B. Zilversmit, The Metabolism of Radioactive Colloids.

Tennessee, University of. D. H. Sprunt, C. E. Nurnberger, and A. H. Lipscomb, Study of the Effect of Radioactive Iodine on Patients with Carcinoma of the Thyroid and with Hyperplastic Thyroids.

Tennessee, University of. R. R. Overman, Physiology of Water and Ionic Balance in Monkeys Subjected to Whole Body Radiation.

Tufts College. D. Rapport, Study of the Relation of Radiation on Reactions Associated with Growth.

Tulane University of Louisiana. G. E. Burch, Jr., Turnover Rates of Chlorine and Rubidium under Controlled Dietary and Therapeutic Conditions in Patients with Chronic Congestive Heart Failure and in Control Subjects.

Tulane University of Louisiana. W. S. Wilde, The Metabolic Exchange of Tissue Electrolytes.

Tulane University of Louisiana. R. H. Turner, The Influence of Radiation Injury upon Physiology of Serum Lipids with Particular Reference to the Function of the Liver.

Utah Medical School, University of. P. B. Price, and R. E. McDonald, The Effects of Ionizing Radiation upon Electrolyte and Water Balance, Blood Volume and Nitrogen Metabolism in Dogs. Studies of the Therapy of Acute Radiation Injury.

Utah, University of. M. M. Wintrobe and G. E. Cartwright, Metabolism of Trace Elements in Animals and Men with Special Reference to their Role in Erythropoieses.

Vanderbilt University School of Medicine. W. J. Darby, Study of the Absorption and Metabolism of Lipids and the Alterations Which Occur in Acute Radiation Injury.

Virginia, University of. A. Chanutin, Effects of Ionizing Irradiation on Mammals.

Virginia Medical School, University of. C. L. Gemmill, The Metabolic Exchange of Radioactive Phosphorus and Potassium in Isolated Cell Systems.

Wake Forest College. G. T. Harrell, Jr., Distribution and Turnover of Sodium and Potassium in Acute Infections.

Wake Forest College. C. Artom, Formation of Tissue Phospholipides.

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[3] Contract administered through Office of Naval Research, Washington, D. C.

Wake Forest College. G. T. Harrell, Jr., et. al. Toxicity of Radiation as Related to Previous Damage and the Functional Capacity of an Organ; The Effect of P–32 and X-rays on Liver and Marrow.

Washington University. W. M. Allen, Use of Gamma Ray as a Therapeutic Agent of Carcinoma.

Washington University. G. J. Dammin and S. C. Bukantz, Investigation of the Effects of Agents Used in the Treatment of Cancer, X-rays and Nitrogen Mustards on the Immunologic Response of Experimental Animals.

Washington University. D. Lipkin, Synthesis of Nucleotides and Related Compounds.

Washington University. I. L. Shechmeister, Investigations of the Relationship between Radiation Damage and the Immune State.

Washington University. G. T. Cori, Enzymatic Mechanisms of Glyogen Synthesis.

Washington, University of. R. H. Williams and N. D. Lee, Studies on Endocrine and Other Factors Governing the Incorporation of Labeled Amino Acids into Tissue Proteins *in vivo.*

Washington, University of. C. A. Finch, Studies Related to Blood Preservation.

Washington, University of. C. A. Finch, Isotope Study in Iron Metabolism.

Washington, University of. R. D. Ray, Mobilization of Radioactive Emitters from Bone.

Washington, University of. H. J. Dauben, Synthesis of Carbon 14—labeled Diethylstilbestrol and a Study of its Metabolism in the Body.

Western Reserve University. H. L. Friedell, Investigations of the Biological Effects of Internally Deposited Radioisotopes and Related Radiobiologic Studies.

Western Reserve University. L. O. Krampitz, Effect of Incorporated Radioactivity on the Biological Activity of Bacteriophage.

Western Reserve University. A. R. Moritz, Physiological and Pathological Aspects of Thermal and Flash Burns.

Western Reserve University. H. G. Wood, A Study of Intermediary Metabolism with Isotopically Labeled Compounds in Perfused Organs, Whole Animals, and Humans.

Western Reserve University. C. E. Carter, The Effects of Ionizing Radiation on the Content and Metabolic Functions of Ergothionine in Hemotopoietic Tissue.

Western Reserve University. B. M. Dobyns, (1) The Chromatographic Separation (starch column) of Iodinated Compounds of Normal and Abnormal Thyroid Tissue; (2) A Study of the Physiological Function and Histological Changes of Thyroids Irradiated with Radioactive Iodine.

Wisconsin, University of. H. F. Harlow and P. H. Settlage, The Effect of Various Forms of Irradiation of the Brain on Learned and Unlearned Behavior of Monkeys and Chimpanzees.

Worcester Foundation for Experimental Biology, Shrewsbury, Mass. H. Hoagland and G. Pincus, Investigation of the Effects of Radiation on the Biosynthesis and Metabolism of Adrenocortical Steroids.

Yale University. J. H. Heller and E. Pollard, Factors Increasing the Radiosensitivity of Malignant Neoplasms.

RAW MATERIALS RESEARCH CONTRACTS

Amherst College. G. W. Bain, Conditions requisite for concentration of uranic and uranyl compounds into uranium ore bodies.

Arizona, University of. W. F. McKee, Sedimentation studies on the Shinarump formation.

Columbia University. W. H. Bucher and A. Gilkey, Fracture pattern study of the Zuni and Lucero Uplifts.

Columbia University. Paul F. Kerr, Alteration studies at Marysvale, Utah.

Harvard University. R. Gibson, Reconnaissance studies in the Big Bend Region of Texas.

Iowa State College. T. Bancroft, The application of statistical methods to Geology.

Jones & Laughlin Ore Co. L. Barrett, Survey of precambrian sedimentary rocks in the states of Michigan, Minnestota and Wisconsin.

Mining Research Corporation. C. W. Livingston, Leaching of uranium ores in place.

Minnesota, University of. J. Gruner, Mineralogical investigations with respect to certain types of uranium ores on the Colorado Plateau.

Pennsylvania State College. H. Wright, Study of primary uranium deposits in the Boulder Batholith area.

Sonic Research Corporation. C. B. Horsley, Design, construction, modification, and test operation of a working model of equipment for the dewatering of a solid-liquid suspension system.

Stanford University. C. O. Hutton, Heavy detrital minerals in the placer deposits of the Snake River area and other areas in Idaho, with special emphasis on thorium mineralogy.

Utah, University of. L. Stokes, Sedimentation studies on the Salt wash formation.

REACTOR DEVELOPMENT RESEARCH CONTRACTS

Arcos Corporation. R. D. Thomas, Welding of Austenitic Stainless Steel. Study of micro-fissuring and other characteristics, with the objective of improving structural usefulness of these steels.

California, University of. H. B. Gotaas, Research and development on the use of sewage treatment processes on radioactive wastes. Investigating use of sanitary engineering methods for disposal of high-volume, low-level radioactive wastes.

California, University of. R. Bromberg and W. L. Martin. Liquid Systems Engineering Research. Studies of bubble and gas formation in liquid systems and transient behavior of high-temperature, high-pressure water systems.

Chicago, University of. L. Skaggs. Utilization of Fission Products. Study of food preservation.

Chicago, University of—American Meat Institute Foundation. H. R. Kraybill. Utilization of Fission Products. Study of food preservation.

Chicago, University of—Food Research Institute. G. M. Dack. Utilization of Fission Products. Study of food preservation.

Columbia University. E. L. Caden and C. G. King. Utilization of Fission Products. To study possibilities of a commercial process of food preservation, utilizing the bactericidal properties of penetrating X- and Gama radiation, including mixed fission products.

Columbia University. W. A. Selke. Utilization of Fission Products. Research and development on the effect of radiations from fission products, particularly the effect of gamma radiation on chemical reactions.

Columbia University. J. R. Dunning. Neutron Cross-Section Measurements.

Designers for Industry. C. H. Standish. Engineering and Fabrication of Mobile Flame-Spray Prototype Equipment.

General Electric Laboratory. M. A. Edwards and W. W. Schultz. Utilization Of Fission Products. Development of high level radiation sources.

B. F. Goodrich Co. John W. Born. Research on Elastomers for Shielding. Preparation of synthetic polymers with high concentrations of H atoms; study of the effects of loading various elastomers with elements of high atomic number or with compounds containing neutron absorbing materials.

Harvard University. H. A. Thomas. Waste Disposal. Determination of distribution and disposition of radioactive material introduced into fresh water reservoirs and streams.

Harvard University. Philip Drinker. Air Cleaning. Research and development on air cleaning, including improved methods and equipment, sampling methods, and training of personnel.

Illinois, University of. H. F. Johnstone. Aerosol Research and Development. Investigation of fundamental properties of aerosols as related to air cleaning.

Illinois, University of. B. B. Babbitt. Effects of radioactive elements on anaerobic digestion of sewage sludges. Investigation of feasibility of concentrating radioactivity using sludge digestion process.

Johns Hopkins University. Abel Wolman. Disposal of Liquid and Solid Radioactive Wastes. Concentration of radioactivity in plumbing systems; adsorption of radioactive material on natural waterborne silts; circulation of estuarial waters, and distribution of activity in institutional incinerators.

Johns-Manville Co. H. T. Coss. Thermal Insulation Matter. To develop insulations with better insulating properties than those now available and with characteristics suitable for reactor use.

Arthur D. Little, Inc. E. Stafford and W. J. Smith. Filter Research and Development. Development of high-efficiency, high-temperature, acid-resistant filters for removal of aerosols from gaseous effluents.

Lovelace Foundation. C. W. Beck. Waste Disposal. Petrographic and mineralogic studies related to disposal of radioactive wastes into the ground.

Massachusetts Institute of Technology. Rolf Eliassen. Water Decontamination. Removal of radioactivity from water supplies by conventional water-treatment methods.

Massachusetts Institute of Technology. B. E. Proctor. Utilization of Fission Products. An investigation of uses for fission products in the sterilization of foods, pharmaceuticals, and tissues.

Michigan, University of. L. E. Brownell. Industrial Utilization of Fission Products. Investigate possible use of fission products and identify areas within which (a) industrial uses of such products are technically and economically feasible, and (b) further research and development would be useful.

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Minnesota, University of. H. S. Isbin and N. R. Amundson. Reactor cooling investigations to study pressure drop and transient flow characteristics in two phase, water-steam systems.

National Bureau of Standards, through Office of Naval Research. U. Fano. Penetration and Diffusion of High-Energy Gamma Rays. Analytical and experimental studies to provide knowledge basic to design of gamma ray shields.

National Bureau of Standards. F. Alt. Shielding Calculations. Detailed calculations of gamma ray attenuation in various media, covering a wide range of gamma energies.

New York University. C. Edwards and W. E. Dobbins. Waste Disposal. Feasibility of trickling filter and activated sludge process for treatment of dilute radioactive wastes.

New York University. Gordon Strom. Atmospheric Disposal. Investigation of feasibility of using wind tunnels in evaluating disposal of gaseous effluents.

Nuclear Development Associates. H. Goldstein. Shielding Studies. Broad review of field, including evaluation of sensitiveness of calculated attenuations to physical data employed, comparison of theoretical methods, collation of experimental results, and development of engineering formulae.

Powder Weld Process Co. R. A. Wiese. Protective Coatings. To provide for development of methods of applying special metals on odd shapes.

Rand Corporation. R. Latter and H. Kahn. Shielding Research. Theoretical approach to attenuation problems, emphasizing Monte Carlo and numerical integration methods.

Rensselaer Polytechnic Institute. J. O. Hougen. Liquid-Liquid Extraction Studies. Research in liquid-liquid extraction; experimentation with pilot-plant size extraction column.

Rensselaer Polytechnic Institute. F. V. Lenel. Beryllium Metallurgy. Using coated powder for powder metallurgy compacts to improve ductility.

Rensselaer Polytechnic Institute. L. G. Bassett. Development of Isotope Separation Methods.

Rensselaer Polytechnic Institute. L. G. Bassett. Utilization of Fission Products by studying the effect of radiation on chemical reactions.

Sohering Corporation. Wm. Tarpley. Utilization of Fission Products.

Stanford Research Institute. P. W. Cook. Feasibility Study of Solar Evaporation. To evaluate feasibility of using energy content in sun's rays to evaporate, reduce volume, and decontaminate liquid radioactive wastes.

Stanford Research Institute. P. J. Lovewell. Industrial Survey. To stimulate industry in investigating uses of fission products and to determine areas of desirable research and development.

Stanford Research Institute. Nevin Hiester. Development of a Continuous Ion-Exchange System.

Texas, University of. E. W. Steel. Disposal of Low Level Radioactive Wastes by Algae Concentration. Studies of practicality of handling low-level wastes through concentration capacities of algae.

U. S. Bureau of Mines. R. C. Corey, Incineration of Radioactive Wastes. To develop a practical incinerator for disposal of solid combustible radioactive wastes at non-AEC locations.

Yale University. R. H. Bretton. Utilization of Fission Products. Research on effect of radiations from fission products, particularly gamma radiation on chemical reactions.

APPENDIX 6

Organization and Information on Procedures of the U. S. Atomic Energy Commission [1]

Organization and Information on Procedures

Part I—Organization

GENERAL

Sec.
1. Creation and authority.
2. Purpose.
3. Programs.
4. Operations.
11. General outline of organization.
12. Committees.

COMMISSION HEADQUARTERS

21. The Commission.
22. Office of the General Manager.
23. Office of the Assistant General Manager for Manufacturing.
24. Office of the General Counsel.
25. Office of the Director of Intelligence.
26. Office of Classification.
27. Office of Industrial Development.
28. Office of Special Projects.
29. Operations Analysis Staff.
30. Division of Research.
31. Division of Reactor Development.
32. Division of Engineering.
33. Division of Production.
34. Division of Construction and Supply.
35. Division of Raw Materials.
36. Division of Military Application.
37. Division of Biology and Medicine.
38. Division of Security.
39. Division of Organization and Personnel.
40. Division of Finance.
41. Division of Information Services.
42. Secretary to the Commission.

MAJOR FIELD OFFICES

Sec.
45. Chicago Operations Office.
46. Hanford Operations Office.
47. Idaho Operations Office.
48. New York Operations Office.
49. Oak Ridge Operations Office.
50. Santa Fe Operations Office.
51. Savannah River Operations Office.
52. Schenectady Operations Office.
53. San Francisco Area Office.

Part II—Information on Procedures

1. Research assistance.
2. Information services.
3. Material and equipment control.
4. Patents, inventions, and awards.
5. Domestic uranium program.

Part I—Organization

GENERAL

Section 1. *Creation and authority.* The Atomic Energy Commission was established by the Atomic Energy Act of 1946 (60 Stat. 755; 42 U. S. C. 1801 et seq.), approved August 1, 1946. Pursuant to section 9 (a) of the act, certain interests, property, and facilities of the Government, including interests, property, and facilities of the Manhattan Engineer District, were transferred to the Commission December 31, 1946, by Executive Order 9816 of the same date.

Sec. 2. *Purpose.* It is the purpose of the Atomic Energy Commission under the Act to effectuate the declared policy of the people of the United States that, subject at all times to the paramount objective of assuring the common defense and security to carry out the

[1] Policies and regulations of the U. S. AEC announced prior to July 1952 can be found in Appendix 4, Fifth Semiannual Report to Congress; Appendix 10, Sixth Semiannual Report to Congress; Appendix 4, Ninth Semiannual Report to Congress; Appendix 6, Tenth Semiannual Report to Congress; Appendix 6, Eleventh Semiannual Report to Congress and in the Federal Register.

development and utilization of atomic energy so that as far as practicable it will be directed toward improving the public welfare, increasing the standard of living, strengthening free competition in private enterprise, and promoting world peace.

SEC. 3. *Programs.* The act provides for the following major programs relating to atomic energy:

(a) A program of assisting and fostering private research and development to encourage maximum scientific progress;

(b) A program for the control of scientific and technical information which will permit the dissemination of such information to encourage scientific progress, and for the sharing on a reciprocal basis of information concerning the practical industrial application of atomic energy as soon as effective and enforceable safeguards against its use for destructive purposes can be devised;

(c) A program of federally conducted research and development to assure the Government of adequate scientific and technical accomplishment;

(d) A program for Government control of the production, ownership, and use of fissionable material to assure the common defense and security and to insure the broadest possible exploitation of the fields; and

(e) A program of administration which will be consistent with the foregoing policies and with international arrangements made by the United States, and which will enable the Congress to be currently informed so as to take further legislative action as may hereafter be appropriate.

SEC. 4. *Operations.* The operations of the Commission are carried out largely by industrial concerns and by private and public institutions under contract with the Commission, in accordance with the requirements and policies established by the Commission pursuant to the Atomic Energy Act. Some of the principal production and research and development activities are conducted by contractors in facilities owned by the Commission. Major production facilities owned by the Commission are located at Oak Ridge, Tennessee, and Hanford, Washington. Production facilities at sites near Paducah, Kentucky, and Aiken, South Carolina, are under construction. Major research and development facilities owned by the Commission are the Ames Atomic Energy Laboratory at Ames, Iowa; the Argonne National Laboratory at Chicago, Illinois; the Brookhaven National Laboratory at Upton, Long Island, New York; the Knolls Atomic Power Laboratory at Schenectady, New York; the Los Alamos Scientific Laboratory at Los Alamos, New Mexico; the Mound Laboratory at Miamisburg, Ohio; the Oak Ridge Institute of Nuclear Studies at Oak Ridge, Tennessee; the Oak Ridge National Laboratory at Oak Ridge, Tennessee; the Radiation Laboratory at Berkeley, California; the Reactor Testing Station at Idaho Falls, Idaho; the Rochester Atomic Energy Project at Rochester, New York; the Sandia Laboratory at Albuquerque, New Mexico; the University of California, Los Angeles, Atomic Energy Project at Los Angeles, California; and the Westinghouse Electric Corporation, Atomic Power Division, at Pittsburgh, Pennsylvania.

SEC. 11. *General outline of organization.* This section outlines the principal elements of the Commission's organization, which is described in greater detail in sections 21 to 53, inclusive.

(a) The Commission is composed of five members, one designated as Chairman, all appointed by the President by and with the advice and consent of the Senate. The Commissioners confer and act as a body on important matters of policy, programs, and administration.

(b) The General Manager, appointed by the Commission, is the principal executive and administrative officer of the Commission.

(1) The General Manager is responsible to the Commission for the formu-

lation of policies and programs by the Commission's divisions. Three of the six program divisions, the Divisions of Research, Production, and Military Application, were established by the Atomic Energy Act of 1946. The Divisions of Reactor Development, Biology and Medicine, and Raw Materials have since been established by the Commission to meet changing requirements of the work.

(2) The General Manager is assisted in his executive and administrative duties by the Deputy General Manager, the Assistant General Manager for Manufacturing, the Office of Special Projects, the Operations Analysis Staff, the Office of Industrial Development, the Office of the General Counsel, the Director of Intelligence, the Office of Classification, and by the Divisions of Finance, Construction and Supply, Organization and Personnel, Information Services, and Security.

(c) Certain executive and administrative functions have been delegated by the General Manager to the division directors, particularly to the Directors of Production, Military Application, Raw Materials, and Reactor Development. The Director of Production is responsible for the Operations Offices at New York, New York; Oak Ridge, Tennessee; Hanford, Washington; Aiken, South Carolina; and the San Francisco Area Office at San Francisco, California. The Director of Military Application is responsible for the Operations Office at Albuquerque, New Mexico. The Director of Reactor Development is responsible for the Operations Offices at Chicago, Illinois; Schenectady, New York; and Idaho Falls, Idaho. The Director of Raw Materials is responsible for the Raw Materials Offices at Grand Junction, Colorado, and New York, New York. These division directors have in turn delegated a large measure of executive and administrative authority to the managers of the field offices. The managers of the field offices are authorized, within stated limits, to enter into contracts on behalf of the Commission, to act as representatives of the Commission for the administration of contracts executed under their authority or assigned to their offices, and to perform other special functions.

SEC. 12. *Committees.* The Atomic Energy Act provides for three permanent committees:

(a) The Joint Committee on Atomic Energy, composed of nine members of the Senate and nine members of the House of Representatives, makes continuing studies of the activities of the Atomic Energy Commission and of problems relating to the development, use, and control of atomic energy. The Commission keeps the Joint Committee fully and currently informed on the activities of the Commission.

(b) The General Advisory Committee, composed of nine members appointed from civilian life by the President, advises the Commission on scientific and technical matters relating to materials, production, and research and development.

(c) The Military Liaison Committee consists of representatives of the Department of Defense, and at the present time has seven members. The Commission advises and consults with the Military Liaison Committee on all atomic energy matters which the Committee deems to relate to military applications, including the development, manufacture, use, and storage of weapons, the allocation of fissionable material for military research, and the control of information relating to the manufacture or utilization of atomic weapons. The Commission keeps the Committee fully informed of all such matters before it, and the Committee keeps the Commission fully informed of all atomic energy activities of the Armed Forces.

COMMISSION HEADQUARTERS

SEC. 21. *The Commission.* The five Commissioners are appointed to varied terms of from one to five years by the President, by and with the advice and consent of the Senate. One member is

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SEC. 22. *Office of the General Manager.* The General Manager is appointed by the Commission. The Commission has authorized and directed the General Manager to discharge those executive and administrative functions of the Commission which may be necessary to carry out the provisions of the Atomic Energy Act of 1946. The General Manager is authorized to redelegate such authority in writing, with or without authority to make successive redelegations, and under such terms, conditions, and limitations as he may deem appropriate. He is assisted in discharging his responsibilities by a Deputy General Manager, who is authorized to take action for the General Manager on all matters falling within the authority of the General Manager.

SEC. 23. *Office of the Assistant General Manager for Manufacturing.* The Assistant General Manager for Manufacturing develops, directs, and coordinates all manufacturing programs of the Commission, specifically those of the Divisions of Production, Raw Materials, and Construction and Supply.

SEC. 24. *Office of the General Counsel.* The General Counsel advises the Commission directly regarding the interpretation of the Atomic Energy Act of 1946 and other sources of legal powers, and the authority for and legal implications of all activities of the Commission. The Office of the General Counsel advises and assists the General Manager, the division directors, and the Managers of Operations in all matters of law and legal policy. The Office of the General Counsel has supervision of the Patent Branch, which administers matters relating to patents and inventions.

SEC. 25. *Office of the Director of Intelligence.* The Director of Intelligence advises the General Manager and the Commission on intelligence matters, including evaluation of reports, estimates of atomic energy developments, liaison with other agencies, and related assignments.

SEC. 26. *Office of Classification.* The Director of Classification administers and effectuates the Commission's programs for the classification and declassification of information.

SEC. 27. *Office of Industrial Development.* The Office of Industrial Development aids in promoting and expanding industrial participation in the national atomic energy program by making available to those interested, developments in the program which may have application in industry.

SEC. 28. *Office of Special Projects.* The Office of Special Projects provides the General Manager and the Commission with staff services related to matters in which the Commission has negotiations with the Department of State.

SEC. 29. *Operations Analysis Staff.* The Operations Analysis Staff prepares for the General Manager technical and economic evaluations of engineering problems which concern more than one AEC division.

SEC. 30. *Division of Research.* The Division of Research develops and supervises programs of research in or involving the physical sciences, including the isotopes program, the transfer of peculiar materials and equipment among research installations, the dissemination and use of technical information in the atomic energy program, and research projects requested by other divisions. The Division also administers the program of cooperation with the Office of Naval Research, the

contracts with the National Research Council and the Oak Ridge Institute of Nuclear Studies, Inc. for a fellowship program, and the exchange of technical information with the British and Canadian atomic energy projects under specially approved governmental procedures.

SEC. 31. *Division of Reactor Development.* The Division of Reactor Development develops and directs the program for the development of reactors, including the equipment and processes which will make possible their effective and safe use; and integrates into this program the special needs of other divisions. The Director of the Reactor Development Division is authorized to make and administer contracts, and to redelegate this authority, except that new or unusual types of transactions are subject to prior consideration of the General Manager.

SEC. 32. *Division of Engineering.* The Division of Engineering handles special engineering and related problems for the Division of Reactor Development.

SEC. 33. *Division of Production.* The Division of Production develops and directs programs of production of fissionable materials; manages related AEC installations and community activities; maintains accountability records of source and fissionable materials; and administers programs for source materials licensing. The Director of Production is authorized to make and administer contracts, and to redelegate this authority, except that new or unusual types of transactions are subject to prior consideration of the Assistant General Manager for Manufacturing.

SEC. 34. *Division of Construction and Supply.* The Division of Construction and Supply develops and maintains policies, procedures, and standards for and provides staff supervision of construction and related engineering matters; priorities, allocations, and expediting; mobilization plans; production facilities; licensing and equipment export control; transportation; communications; procurement and contracts; storage, utilization, and disposal of materials (other than source and fissionable materials and weapons components); equipment; supplies; real estate; records management; and provides office services for the Washington office.

SEC. 35. *Division of Raw Materials.* The Division of Raw Materials develops and directs programs of exploration for and acquisition and production of raw source materials, including process development and production operations; the procurement of certain special materials; and advises the Assistant General Manager for Manufacturing on foreign ore procurement. The Director of Raw Materials is authorized to make and administer contracts, and to redelegate this authority, except that new or unusual types of transactions are subject to prior consideration of the Assistant General Manager for Manufacturing.

SEC. 36. *Division of Military Application.* The Division of Military Application directs the research, development, production and testing of atomic weapons; manages related AEC installations and communities; and assists in maintaining liaison between the Atomic Energy Commission and the Department of Defense. The Director of Military Application is authorized to make and administer contracts, and to redelegate this authority, except that new or unusual types of transactions are subject to prior consideration of the General Manager.

SEC. 37. *Division of Biology and Medicine.* The Division of Biology and Medicine develops and supervises programs of research in biology, medicine, and biophysics at AEC facilities and through direct contracts with private institutions; supervises measures to guard the health of atomic energy employees and the public; maintains liaison with Federal Civil Defense Admin-

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SEC. 38. *Division of Security.* The Division of Security develops and maintains policies, standards, and procedures to assure the safekeeping of restricted data and other classified matter and to assure the protection of installations and materials of AEC; maintains liaison with the Federal Bureau of Investigation, the Department of Defense, and other agencies as required for the protection of restricted data and for the clearance of personnel; and operates the security program for the Washington Area.

SEC. 39. *Division of Organization and Personnel.* The Division of Organization and Personnel develops and maintains the independent AEC merit system through the administration of the personnel policy and related procedures; provides staff assistance in all matters of organization, management methods, contractor personnel administration, and safety and fire protection; and provides personnel services for the Washington Office.

SEC. 40. *Division of Finance.* The Controller has direct responsibility to the Commission to report the financial status of the agency and the results of its operations in conformity with generally accepted accounting principles; to detect fraud and improper diversion of assets and to prevent such occurrences to the extent possible by the maintenance of reasonable accounting and business-management controls; and to advise on financial implications of proposed courses of action. As Division Director, he is responsible to the General Manager for the performance of the Division of Finance. The Division of Finance plans, develops, and maintains over-all policies and standards for accounting, auditing, budgeting and insurance; plans, develops, and maintains procedures for program authorization and progress reporting; performs financial and business-management services for the Washington Office.

SEC. 41. *Division of Information Services.* The Division of Information Services advises and assists the Commission, General Manager, and Washington principal staff in disseminating scientific, technical and general information arising from policy determinations and program developments in accordance with provisions of the Atomic Energy Act of 1946 and other statutes. The Division assists Managers of Operations in complying with the requirements of the Commission, General Manager, and Directors of Program Divisions for coordination of public and technical information programs through advice to their public and technical information staffs.

SEC. 42. *Secretary to the Commission.* The Secretary to the Commission maintains official minutes and records of the Commission; reviews and processes documents to be presented to the Commission; advises the staff, on behalf of the General Manager, of Commission decisions and requests; and provides related services.

MAJOR FIELD OFFICES

SEC. 45. *Chicago Operations Office.* The Chicago Operations Office, under the direction of a Manager of Operations responsible to the Director of Reactor Development, administers contracts for research and development programs, including those at the Argonne National Laboratory; provides management for the execution of programs at the University of California at Berkeley, Ames Laboratory at Iowa State College at Ames, Iowa, the Westinghouse Company at Pittsburgh, Pennsylvania, and the General Electric Company at Lockland, Ohio; administers related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase,

contract, subcontract, extension, or modification in excess of $2 million is subject to the approval of the Director of Reactor Development.

SEC. 46. *Hanford Operations Office.* The Hanford Operations Office, under the direction of a Manager of Operations responsible to the Director of Production, is responsible for the production of fissionable materials and other special materials and fabricated items; the management of Richland Village; related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase, contract, subcontract, extension, or modification in excess of $5 million is subject to the approval of the Director of Production.

SEC. 47. *Idaho Operations Office.* The Idaho Operations Office, under the direction of a Manager of Operations responsible to the Director of Reactor Development, provides for the design, construction and operation of nuclear reactors and facilities and services as necessary; manages the National Reactor Testing Station and performs other special assigned functions; administers related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase, contract, subcontract, extension, or modification in excess of $2 million is subject to the approval of the Director of Reactor Development.

SEC. 48. *New York Operations Office.* The New York Operations Office, under the direction of a Manager of Operations responsible to the Director of Production, provides for receiving and warehousing source and other raw materials, processing source materials and other raw materials; administers the contract for a research and development program at the Brookhaven National Laboratory; is responsible for source material licensing; supervises the St. Louis and Cleveland Area Offices; administers contracts for research programs in the field of biology and medicine at Rochester, Western Reserve, and Columbia Universities; administers direct and contract operations for the construction and operations of the Fernald Area Feed Materials Production Center at Ross, Ohio; administers related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase, contract, subcontract, extension, or modification in excess of $2 million is subject to the approval of the Director of Production.

SEC. 49. *Oak Ridge Operations Office.* The Oak Ridge Operations Office, under the direction of a Manager of Operations responsible to the Director of Production, is responsible for the production of fissionable materials and certain special materials and fabricated items; administers contracts for research programs at Oak Ridge National Laboratory and other AEC installations administered by the Oak Ridge Operations Office; manages the community of Oak Ridge; administers the AEC isotope-production and distribution program in accordance with policies of the Division of Research; supervises the Dayton and Paducah Area Offices; administers related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase, contract, subcontract, extension, or modification in excess of $5 million is subject to the approval of the Director of Production.

SEC. 50. *Santa Fe Operations Office.* The Santa Fe Operations Office, under the direction of a Manager of Operations responsible to the Director of Military Application, is responsible for research, development, production, and testing in the field of atomic weapons; supervises facilities at Sandia, New Mexico; manages the community at Los Alamos, New Mexico; administers related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase, contract, sub-

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SEC. 51. *Savannah River Operations Office.* The Savannah River Operations Office, under the direction of a Manager of Operations responsible to the Director of Production, administers assigned programs for the production of fissionable materials, special materials, and fabricated items; supervises the Dana and Wilmington Area Offices; administers related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase, contract, subcontract, extension, or modification in excess of $5 million is subject to the approval of the Director of Production.

SEC. 52. *The Schenectady Operations Office.* The Schenectady Operations Office, under the direction of a Manager of Operations responsible to the Director of Reactor Development, carries out the policies of the Commission for development of nuclear reactors in the Schenectady area, including the Knolls Atomic Power Laboratory; administers related research and development contracts; supervises work in the Schenectady area performed as assistance to the Hanford Operations Office; administers related engineering and construction programs; and makes or approves contracts and subcontracts, except that each purchase, contract, subcontract, extension or modification in excess of $1 million is subject to the approval of the Director of Reactor Development.

SEC. 53. *San Francisco Area Office.* The San Francisco Area Office, under the direction of an Area Manager responsible to the Director of Production is responsible for administration of contracts for research and other programs at Livermore, California, and such other installations as may be designated; administers related engineering and construction programs; and makes or approves purchases, contracts, and subcontracts, except that each purchase, contract, subcontract, extension, or modification in excess of $2 million is subject to the approval of the Director of Production.

Part II—Information on Procedures

SECTION 1. *Research assistance*—(a) *Research and development contracts.* The Commission has entered into many contracts with public and private institutions for the prosecution of research and development work in various branches of physical, biological, and medical science and technology. These contracts are negotiated and supervised on behalf of the Commission by the General Manager, the Managers of Operations and their authorized representatives, and the scientific staff of the divisions concerned. The Division of Research is responsible for the development and supervision of the research program involving the physical sciences in AEC installations and outside organizations, including the isotope program, and inquiries regarding participation in this program may be addressed to the Director of the Division of Research in Washington. The Division of Biology and Medicine is responsible for administration of the program for the support of basic research relating to atomic energy in the fields of biology and medicine, and inquiries regarding participation in this program may be addressed to the Director of the Division of Biology and Medicine in Washington.

(b) *Distribution of isotopes.* The Commission assists and fosters research and development by a program for the sale and distribution of various radioactive and stable isotopes and for the irradiation of materials in an operating nuclear reactor. Because radioisotopes may present a distinct health hazard unless used with proper care, the Commission desires to insure that they are distributed in a manner that will assure safe handling. Any scientist working in a recognized academic, medical, or

industrial research institution in the United States may address his specific request for isotopes or irradiation service to the U. S. Atomic Energy Commission, Isotopes Division, P. O. Box E, Oak Ridge, Tennessee. The Isotopes Division processes and approves applications. The approved application is returned to the applicant for transmittal to any of several distributors. The distributor, on receipt of the approved application, fills the order and bills the applicant according to a price schedule approved by the Commission. Specific regulations governing the distribution and use of radioisotopes are contained in Title 10, Part 30, Code of Federal Regulations, published in 16 F. R. 3251, April 13, 1951.

(c) *Fellowship program.* The Division of Research is responsible for the administration of the AEC fellowship program in the physical and biological sciences. The fellowship program for the 1952–1953 academic year provides only for renewals of previously awarded fellowships and will be administered for the Commission by the Oak Ridge Institute of Nuclear Studies. In addition, the Division of Biology and Medicine is responsible for the administration of fellowship programs in Radiological Physics, Industrial Medicine, and Industrial Hygiene for the purpose of providing specialized training to fill the need for personnel in these fields. Applications for fellowships in Radiological Physics and Industrial Hygiene may be submitted to the Oak Ridge Institute of Nuclear Studies, Inc., University Relations Division, P. O. Box 117, Oak Ridge, Tennessee. Applications for fellowships in Industrial Medicine may be submitted to the School of Medicine and Dentistry, Atomic Energy Commission Project, University of Rochester, Rochester, New York.

SEC. 2. *Information services.* Writers or speakers may submit material to the AEC for security review and for assistance in determining if the material is free of restricted data (as defined in the Atomic Energy Act). Review and assistance will be given insofar as national security permits. Such submission of material, as well as any requests for publicly releasable information concerning the Commission's organization and activities, should be directed to the Division of Information Services, U. S. Atomic Energy Commission, Washington 25, D. C.

SEC. 3. *Material and equipment control.* (a) Pursuant to section 5 (b) of the Atomic Energy Act of 1946, a regulation which sets forth necessary procedures for licensing the transfer of source materials (materials containing uranium and thorium) has been published as Code of Federal Regulations, Title 10, Part 40 (14 F. R. 1156), March 9, 1949. Correspondence and other inquiries concerning possession, transfer, and use of source materials should be addressed to the U. S. Atomic Energy Commission, New York Operations Office, P. O. Box 30, Ansonia Station, New York 23, New York.

(b) Pursuant to section 4 (e) of the Atomic Energy Act of 1946, a regulation which sets forth necessary procedures for licensing the manufacture and transfer of facilities for the production of fissionable material has been published as Code of Federal Regulations, Title 10, Part 50 (14 F. R. 3492, as amended in 15 F. R. 7137, October 19, 1950), July 1, 1949. Correspondence and other inquiries in this connection should be addressed to the Division of Construction and Supply, U. S. Atomic Energy Commission, Washington 25, D. C.

SEC. 4. *Patents, inventions, and awards.* (a) Rules and regulations with respect to applications for awards, just compensation or the fixing of reasonable royalty fees in connection with patents and inventions under the provisions of section 11 of the Atomic Energy Act of 1946 have been published as Code of Federal Regulations, Title

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10, Part 80 (13 F. R. 3457), January 18, 1948. Inquiries with respect to such matters should be addressed to the Clerk, Patent Compensation Board, U. S. Atomic Energy Commission, Washington 25, D. C.

(b) In regard to patents and patent applications owned by the Commission and available for licensing, the Commission grants non-exclusive, royalty-free licenses as part of its program to make non-secret technological information available for use by industry. Periodic listings of such patents and patent applications are released in press releases and published in various journals, including the U. S. Patent Office, Official Gazette, and the Atomic Energy Commission Nuclear Science Abstracts. Applicants for licenses should apply to the Chief, Patent Branch, Office of the General Counsel, U. S. Atomic Energy Commission, Washington 25, D. C.

SEC. 5. *Domestic uranium program.* The domestic uranium program of the Commission, under the direction of the Division of Raw Materials, was put into effect in April 1948. The details of the domestic ore purchase schedules have been explained in Domestic Uranium Circulars Nos. 1, 2, 5, and 6, which were published as Code of Federal Regulations, Title 10, Part 60 (13 F. R. 2089; 13 F. R. 2090; 16 F. R. 2333). On February 28, 1951, the Commission announced a new bonus for initial production from new and certain existing domestic mining properties. Details of this bonus offer appear in Domestic Uranium Circular No. 6, which was published as Code of Federal Regulations, Title 10, Part 60 (16 F. R. 6426), June 27, 1951. The Division of Raw Materials has developed a booklet entitled "Prospecting for Uranium" which provides valuable information and assistance to those interested in prospecting for radioactive materials. This booklet was revised in 1951 and may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 45 cents a copy.

Dated: June 2, 1952.

WALTER J. WILLIAMS,
Deputy General Manager.

APPENDIX 7

Report to the President by the Atomic Energy Labor Relations Panel

December 1, 1951–June 1, 1952

A dispute between the Sandia Corporation and two unions at the Sandia Base was the only one involving production handled by the Panel during the period covered by this report. Recommendations, followed by further mediation, resulted in settlement and an agreement was signed by the parties on March 24, 1952.

Construction, especially at the Paducah gaseous diffusion project, continued to be the chief concern of the Panel. A number of stoppages, involving at different times almost all crafts, interfered with the work at Paducah. Fortunately, and as a result of the diligent cooperation of the responsible AFL international officers, these stoppages were generally of short duration. Their frequency indicates a weakness in the labor relations at this project, and in the Panel's ability to maintain continuity of operations where an understanding and a willingness to cooperate with its procedures are not fully recognized at the local level.

In an effort to rectify this situation, the Panel held a series of meetings at Paducah on January 5 and 6, 1952. Present at these meetings were international and local officers of all the crafts, as well as the responsible executives of the McGraw Co., the prime contractor at this project. An opportunity was given to all concerned to air their grievances. Out of the discussions came a preliminary memorandum of agreement for the orderly handling of future disputes. At the request of the parties, the Panel retained jurisdiction of labor relations at Paducah until more complete procedures could be worked out for the the prevention of strikes.

Although, as already mentioned, the signing of this memorandum of agreement did not end all stoppages at Paducah, the Panel believes that it marked a turning point in the labor relations at this construction project and that the habit of settling disputes through negotiations rather than unilateral and precipitous actions will take root.

If, in these times, there is need for a reminder, the situation at Paducah is further evidence that the prevention of strikes in a country that respects the rights of the individual is not subject to absolute safeguards. The agreement-making process, though often slow and uncertain, nevertheless remains the most durable barrier to serious work interruptions.

Two other construction disputes, both at Hanford, required Panel mediation and recommendation. One of these has been settled, the other is still pending.

The problem of labor relations in atomic energy construction was discussed at some length at a meeting held on May 14 with the Atomic Energy Commission. At this meeting it was agreed that the lessons of the past indicated the advisability of planning the labor relations of a construction project well in advance of the start of actual construction. More specifically, it was believed that preliminary discussions between both international and local union leaders and the prime contractors should be conducted to define which local agreements would be applicable to the job, and what modifications in the local agreements might be necessary to meet the special requirements of the job. The Atomic Energy Commission labor relations staff, with

the cooperation of the Panel, will implement this policy recommendation.

The Panel had before it two disputes involving maintenance activities. One was between the International Brotherhood of Electrical Workers, AFL, and Management Services at Oak Ridge. This was settled by mediation. The other, between the International Brotherhood of Electrical Workers, AFL, and the Zia Co., at Los Alamos is still pending.

Also before the Panel is a dispute involving the union shop issue in production at Hanford.

Cases 34 and 42 were in the nature of "alerts", disputes which were drawn to the Panel's attention but were settled before it had to take any action.

In the report of the President's Commission on Labor Relations in the Atomic Energy Installations, of April 1949, that Commission concluded its recommendations as follows:

"We make no recommendation for enactment of special legislation at this time, believing that the recommendations or something substantially equivalent to them should be given a trial for a period of 2 or 3 years. If they failed to secure continuity of production at any vital Government-owned, privately operated atomic energy installation, the effect would be to throw the full responsibility back into the hands of the Atomic Energy Commission. If this responsibility then seemed to make any special legislation necessary, the Commission would, in recommending legislation, have the benefit of the practical experience gained by the work of the Panel and the Congress would have the benefit of that experience in considering such special legislation."

With this report the Panel has now completed its third year of operation. During this time, there has been no interruption in vital government-owned, privately operated atomic energy installations. The Panel does not presume to take responsibility for this record. Much of the credit belongs to the patriotic and responsible attitude of key CIO and AFL officers, as well as to the management policies of the Atomic Energy Commission contractors who operate these important facilities. There has also been an unusual sense of responsibility and dedication noticed by the Panel on the part of the workers with whom the Panel has come into contact at the plants and laboratories. Nevertheless, it is true that all of these factors, plus the voluntary procedures which you adopted in 1949 and which have been administered by this Panel, have succeeded in maintaining production in vital atomic energy installations.

CASE NO. 33. AEC INSTALLATION: Sandia Base, Albuquerque, N. Mex.; PARTIES: Sandia Corp.; Atomic Projects and Production Workers, Metal Trades Council, AFL; Office Employees Int'l Union, AFL, Local 251

The history of this case up to December 1, 1951, was outlined in the previous report. The Panel met with the parties in Washington from December 1 through December 5. The first 2 days were spent in hearing a formal presentation of the positions of each side before a full Panel. On Monday, December 3, the unions reduced their negotiating committee to three men for the purpose of continuing direct negotiations. For these sessions, which lasted through Wednesday, December 5, Dr. Dunlop and Mr. Straus of the Panel were available to the parties for consultation only. On December 6, Dr. Dunlop and Mr. Straus resumed active mediation.

At midnight of December 6, with the issues narrowed down to the question of the job grading plan and the union shop, a deadlock was reached. At that point Dr. Dunlop indicated that the Panel would issue recommendations and union and management representatives returned to Albuquerque.

The parties submitted to the Panel the two issues on which a deadlock had been reached, and, in addition, nine other items. Panel recommendations

were issued on February 8, 1952. In its report to the parties the Panel made specific recommendations for the settlement of seven issues. Two issues were returned to the parties with the opinion that they were matters of detailed administration with which the Panel should not be concerned. With regard to the job grading plan, duration and union security, the Panel departed from its ordinary formula and issued what it called "suggestions," rather than recommendations.

In issuing these suggestions the Panel made it clear that these were matters which went to the heart of the bargaining relationship between the parties and could only be successfully settled by agreement. In introducing these suggestions the Panel said:

"While we are not willing at this time to make further recommendations on these related issues, we do think that the labor relations of the Sandia Project would benefit if the parties could voluntarily agree to the following:

A Full acceptance by the Unions of the idea of job grading under a plan administered by management but with the right to safeguard abuses through operation of a grievance procedure established for this purpose;

B An agreement with a three-year duration;

C A union shop clause suitable to the Sandia Project."

On February 18 the Panel received a telegram from the unions indicating that the recommendations had been rejected. In a letter of explanation, the unions advised the Panel that this rejection was based upon a feeling that the Panel had "failed" to resolve or recommend satisfactory language on 1) job grades; 2) union shop; 3) work schedules, and other basic issues, and that in referring the issues back to the parties "there is indicated a complete failure to recognize the history of bargaining at the Sandia Base."

On Wednesday, March 5, the Panel received telegrams from two international officers of the AFL, Metal Trades Council, who had flown to Albuquerque. These telegrams said, in part:

"Conference with officers of Council and Union discloses * * * some recommendations are acceptable. Investigation discloses rejection is due to Panel failure to squarely meet basic issues * * * suggest Panel members meet with parties in Albuquerque without delay * * *"

A Panel meeting was arranged for March 20 in Albuquerque, and immediately thereafter assurances were received from the unions that the status quo would be maintained.

The Panel met with the parties in Albuquerque on Wednesday, March 19, through Saturday, March 22. These sessions were confined to mediation only and the Panel made it clear that it would issue no further recommendations. On Saturday, March 22, an agreement was reached by the parties for a new contract based on minor modifications of the February 8 recommendations of the Panel.

An agreement was signed by the parties on March 24, 1952.

CASE NO. 34 AEC INSTALLATION: Dana Project, Terre Haute, Ind.: PARTIES: Girdler Corp.; Office Workers Union

This dispute was settled through direct negotiation without requiring active Panel intervention.

CASE NOS. 35, 37, 38, 40, 41. AEC INSTALLATION: Paducah, Ky.; PARTIES: F. H. McGraw Co.; A. F. of L. Building Trades

Ever since the start of construction at Paducah in April 1951, there have been intermittent work stoppages on the job. The first time that the Panel was asked to intervene was on September 20, 1951, in a dispute which was described in our last report listed as case No. 24.

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On December 29, the F. H. McGraw Co. asked the Panel to intervene in a strike which began over a dispute between the Company and the Carpenters, but which soon spread and involved a majority of the crafts. The immediate issue was the dismissal of six carpenters for alleged loafing on the job. (Case No. 35.)

The Panel immediately sent telegrams to all of the international presidents, to the local craft officials, to the Kentucky State AFL Council and to the Company, asking that construction be resumed and calling a meeting for January 5 in Paducah. On the following day, December 30, virtually full production had been restored.

A hearing was conducted by the Panel in Paducah on January 5 and 6. International and local officers of almost all crafts were present, as well as the top Company officials. Both the Company and the Unions aired their grievances in full discussion. The Company complained of an unwillingness on the part of the Unions' business agents to process disputes through the machinery established for this purpose. The Unions complained that the Company had not established adequate machinery. In these sessions it became evident that there was no general understanding of which local agreements governed the various crafts on this job.

At the close of the hearings on January 6, the Unions and the F. H. McGraw Co. drew up the following memorandum of agreement:

"Paducah, Ky. January 6, 1952

Memorandum of Agreement

It is agreed that the following procedures will be followed by the undersigned in the handling of grievances, exclusive of questions of jurisdiction.

1. The company immediately will confer with the business agent of each craft separately for the purpose of reaffirming and agreeing on contractual grievance procedure as contained in existing agreements, or to draw up grievance procedure where provisions are not contained in existing agreements.
2. The company is to name responsible labor relations personnel to hear grievances and who have authority to settle permanently grievances on the part of the company.
3. The company to guarantee that once a grievance is settled that they will enforce the settlement.
4. The company agrees that after a written grievance is presented to the Manager of Labor Relations that Company labor relations personnel within 24 hours will set meeting and will hear grievance within 48 hours from time of filing. If the grievance is not settled in time limits set forth above, then the Company agrees that fully authorized representatives of the Company will meet with the International Union or authorized representative within 72 hours and settle same or agree on further steps to be taken if necessary. The time limits of hearing set forth above can by mutual agreement of the parties concerned be extended.
5. All agreements reached must be reduced to writing and signed by the parties.

For F. H. McGraw Co.
F. J. Mayo, Project Manager
Larry Nolan, Boilermakers.
Edw. A. Paine, Boilermakers.
Charles Gohlson, Bricklayers.
Odus Reid, Carpenters (L. 559).
Gordon M. Freeman, Electricians.
W. B. Saunders, Ironworkers.
Edgar F. Smith, Laborers.
J. L. Shaw, Roofers (L. 208).
Randolph Heyers, Sheet Metal Workers.
Evan Dale, Laborers.
Forrest Bugher, Oper. Engineers (181)
Lee Shelby, Painters (L. 500).
Vincent J. Lee, Plasterers & Cement Masons.

CHARLES OWINGS, Plasterers & Cement Finishers.
BEN D. VETTER, Roofers.
CARL J. HECKEL, Sheet Metal Workers.
GUS SIEBERTS, Teamsters (L. 336).
LOUIS BRADFORD, Plumbers & Steamfitters (L. 184)."

In spite of this memorandum, there have been a number of work stoppages at Paducah since it was signed on January 6. The first of these which was drawn to the Panel's attention was a strike of the Union of Operating Engineers, Local 181, on January 18 (case No. 37). The Panel sent telegrams to both the Company and the Union, reminding them of their memorandum of agreement, asking them to resume production, and calling for a report of events which led to the stoppage and an explanation of why the grievance procedures had not been followed. A letter from the Company on January 22 gave the following explanation:

"* * * we have had and still do have grave doubts as to whether we can properly make retroactive wage payments to the Union without being in violation of the Wage Stabilization Laws.

"* * * We, and the Atomic Energy Commission, agree that the first question to be resolved was which of two existing agreements, namely the Louisville or the Lexington Agreement, should apply to this project. The Union of Operating Engineers had negotiated contracts in the aforementioned cities between themselves and the representative Contractor Associations. Both agreements purported to cover all of the State of Kentucky with the exception of Boone, Campbell, Pendleton and Kenton Counties. Likewise, the decisions handed down by the C. I. S. C. relative to each agreement similarly state the same territorial jurisdiction as being covered. The only difference in the decisions is that the Lexington decision is retroactive to September 1st. This is apparently due to the difference in negotiation dates.

"* * * Further, we and the Atomic Energy Commission question whether or not we can properly be said to adhere to either of these local agreements. While we admittedly abide by the working conditions of the area we do not necessarily adhere in all respects to the provisions contained in local agreements. In a telephone conversation had with Professor Cox, Co-Chairman of the C. I. S. C., on January 14th he unofficially indicated that perhaps special or technical significance was meant by the C. I. S. C. to attach to its use of the word 'adhere' in its decisions. In such event, our paying retroactively in accordance with either decision would apparently constitute a wage stabilization violation."

The Union's reply informed the Panel that the strike had not been authorized but explained that the "unauthorized" strike was worker resentment over the Company's failure to pay the retroactive wages which had been authorized by the Construction Industry Stabilization Commission.

On January 29, the Panel received another communication from the Company disagreeing with the Union's interpretation of the C. I. S. C. ruling. The Company said that it believed that the Paducah project was covered by a different ruling than the one cited by the Union, and added that the Company was prepared to submit this controversy to the Panel since the C. I. S. C. would not issue a ruling in cases where the petitioning parties were in disagreement.

The Panel replied by again reminding the parties of the machinery they had jointly established for settling disputes, asking them to make use of this machinery. The Panel also suggested that a first step toward settlement would be for the parties to determine which local contract covered the Paducah job and to forward a copy of this contract to the Panel.

On February 8 the parties joined in petitioning the C. I. S. C. for an agreed amount of retroactive wage adjustment.

The Sheet Metal Workers, Local 110, threatened to strike on February 4 over the assignment of work in a warehouse (case No. 38). On this date the Carbide & Carbon Corp. took possession of a part of this warehouse to commence its training operations in preparation for the start of production. The Carbide & Carbon Corp. planned to erect some racks and shelves, using its own employees. It was this work which the Sheet Metal Workers believed should be classified as construction, and therefore within their proper jurisdiction.

On February 19, the Sheet Metal Workers walked off all construction work in this building because of this same dispute. The Union officials told the Panel that this strike was unauthorized. On March 2 the McGraw Co. wired the Panel that it understood the Sheet Metal Workers' Local had authorized a picket line covering the entire job. The Panel thereupon sent a telegram to the International President requesting that the picket line be withdrawn. The Union complied with this request. This dispute was settled when the Sheet Metal Workers Union requested the Secretary of Labor to rule whether the disputed work was construction work under the Davis-Bacon Act. The Secretary of Labor so ruled.

On March 6 the Panel was notified by McGraw that the Painters had gone on strike (case No. 40). Telephone calls by the Panel to the International Office resulted in the termination of this strike.

On March 13 there was a widespread walkout engaged in by several crafts, including the laborers, sheet metal workers, teamsters, carpenters and electrical workers (case No. 41). Approximately 769 men took part in this stoppage. The apparent cause of the dispute was a change in shift operations. At the request of the Panel the Company explained the nature of the change and said that advance notice had been given to officials of all the unions affected. At about this time, another dispute arose involving a jurisdictional question. On March 21 the Workman Co. of Nashville, Tennessee, one of their subcontractors, held a meeting to discuss jurisdiction of work claimed entirely by the Sheet Metal Workers and claimed in part by the Carpenters. The work in dispute was the installation of acoustical ceilings. Immediately after the hearing, the Workman Co. assigned part of the work to the sheet metal workers and part to the carpenters. At first, the sheet metal workers refused to abide by the work assignment and a stoppage was threatened. This matter was eventually settled by the normal jurisdictional procedures of the building industry.

On April 12, 925 members of Local 816, I. B. E. W., 124 Millwrights, and an unidentified number of Carpenters walked off the job. The Panel sent telegrams to the International Presidents asking that the job be manned and that the established grievance procedures be utilized.

The above recital of Panel activities at Paducah during the period covered by this report indicates a weakness in the Panel procedures so far as construction at this installation is concerned. One optimistic note in this picture has been the prompt and wholehearted cooperation of the responsible international officers in using their authority to get the men back on the job when asked to do so by the Panel. But in atomic energy, such fireman tactics after a strike has once begun is not good enough. There is need for more understanding and cooperation of local union officers and rank and file, as well as for more skillful dispute handling by local company executives and supervisors. The Panel believes that it made a start in this direction in its meetings on January 5 and 6. It may be advisable to hold more such meetings in the future.

CASE NO. 36. AEC INSTALLATION: Hanford, Wash.; PARTIES: General Electric Co.; Hanford Atomic Metal Trades Council

On January 10 the Panel received a letter from James A. Brownlow, president of the Metal Trades Department, AFL, asking the Panel to take jurisdiction of a dispute between the General Electric Co. and the Hanford Atomic Metal Trades Council over the issue of union shop.

On January 23, the Panel received another letter from Mr. Brownlow informing the Panel that negotiations over this issue had been resumed and suggesting that the Panel take no action until further advised by the Union. Accordingly, on January 28 the Panel placed this case on its inactive list.

On April 24, the Panel received a letter from B. A. Gritta, who was at that time acting for Mr. Brownlow, renewing the Union's request that the Panel assume jurisdiction over this dispute. The Panel immediately notified the Company of this correspondence.

On May 15, the Panel held a meeting in Washington with the Company and the Union to discuss further procedures for handling this matter. At the close of this meeting the Panel told the parties that it would postpone a decision concerning further action until all aspects could be discussed by the Panel in executive session.

As of May 31, this case is still open.

CASE NO. 39. AEC INSTALLATION: Hanford, Wash.; PARTIES: Guy F. Atkinson Co. and J. A. Jones Construction Co.; International Brotherhood of Boilermakers, Iron Ship Builders, Welders & Helpers of America, Locals No. 104 and 541

On February 16, 1952, the Panel received a telegram from the Atkinson-Jones Construction Co. asking it to take jurisdiction of a dispute involving the International Brotherhood of Boilermakers, Iron Ship Builders and Helpers of America, Locals 104 and 541, and two subcontractors engaged in construction work at Hanford. Because of a disagreement, primarily over the payment of subsistence pay, the Boilermakers were refusing to man the job. On the same day, the Atomic Energy Commission informed the Panel that the "inability of these companies to proceed with their contracts is now seriously impeding the construction work."

Telegrams were sent to the Companies and to the top officials of the Union stating that jurisdiction had been assumed and requesting that they proceed with construction.

On February 18, the Panel was informed that the dispute involved the question of wage rates in addition to the dispute over subsistence pay. There was no dispute over the amount of the wage increase, but the Atkinson-Jones Co. had not authorized this rate to be put into effect because no approval for it had been received from the Construction Industry Stabilization Commission. The Company contended that specific C. I. S. C. approval was required, whereas the Union argued that no such approval was necessary, because the requested rate had already been approved for a master contract covering seven Western States, including the State of Washington. The Company countered by saying that the Hanford Project was not covered by the "Seven-State Agreement." With respect to wage rates, the proposed Hanford schedule and the current "Seven-State Agreement" were identical. But to consider that the C. I. S. C. approval for the "Seven-State" wages covered Hanford might prejudge the travel pay and subsistence issue where the "Seven-State" clause and the Project Agreement differed.

After talks with all concerned by telephone, the Panel asked the Atkinson-Jones Co. to petition the C. I. S. C. unilaterally for separate approval of the wage rates. The C. I. S. C. then obtained confirmation from the Union that these were the wage rates agreed to, and thereupon wired its approval to

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both parties. Construction was at that time commenced and has since continued without interruption.

A meeting of the parties was held in New York City on March 3. At this meeting, the sole remaining issue was travel pay and subsistence since the hourly wage rate had been agreed to and approved by the C. I. S. C. as indicated above.

The Company's position was that the Hanford Project Agreement with respect to travel and subsistence pay should govern. The Hanford agreement covering the majority of the building trades unions establishes subsistence pay, known at this project as "isolation pay." This rate was increased in January by a Wage Stabilization Board recommendation in a dispute case covering most of the crafts at the Hanford project.

The original establishment of isolation pay was the result of negotiations in 1947 at which time the unions on the project, including the Boilermakers, subscribed to the principle of uniform isolation pay. The first addendum to this agreement covering the Boilermakers, however, departed from the project agreement with respect to isolation pay and wrote in, instead, the then applicable "Seven-State Agreement" clause. This was later modified, in early 1948, to conform to the project agreement. The Boilermakers claim that this modification was made against their will, but they went along with it at the time in order to cooperate in the completion of the facilities then under construction. Since then, the Union says, it has been trying to negotiate back its standard area-wide provisions. The existing isolation pay provision for those living off the construction site was $2 per day, or $12 per week. For the majority of the other crafts, this amount was raised by the Wage Stabilization Board recommendation to $15.75 per week. The Union demand, based on the current "Seven-State Agreement" was $24.50 per week.

The Panel issued its recommendations on April 14, 1952. It recommended that the Boilermakers accept the "isolation pay" provision of the basic Hanford agreement. In its opinion, the Panel said:

"The basic issue now before the Panel is whether the Boilermakers should be allowed at Hanford the "subsistence" pay of the "Seven-State" agreement in lieu of the uniform "isolation" pay provision of the project agreement. The facts are that all crafts on the project work under the same advantages and disadvantages so far as living conditions and isolation are concerned. While it is true that three crafts receive isolation pay which differs in some particulars from the applicable provisions of the Hanford project agreement, the vast majority of the construction workers receive the same isolation pay."

On May 8 the Panel received a brief from the Boilermakers entitled "Union Exceptions to Panel Recommendations." As of May 31, there were no further developments.

CASE NO. 42. AEC INSTALLATION: Kansas City, Mo; PARTIES: Bendix Aviation Corp.; International Association of Machinists, Local 314

This dispute was settled through direct negotiation, without requiring active Panel intervention.

CASE NO. 43. AEC INSTALLATION: Oak Ridge, Tenn.; PARTIES: Management Services, Inc.; International Brotherhood of Electrical Workers, AFL, Local 760

On April 2 the Panel received a telegram from Management Services, Inc., successor to the Roane-Anderson Co., operating the town-site facilities at Oak Ridge, in which they requested the Panel to take jurisdiction over a dispute between the Company and Local 760, International Brotherhood of Electrical Workers, AFL. The Panel immediately replied that it would initiate its preliminary investigation of this matter.

On April 8, the parties were advised that a preliminary report from the Federal Mediation and Conciliation Service indicated that the wage dispute "involves union request and management reluctance to exceed Wage Stabilization Board cost-of-living formula for adjustments amounting to 4.7 percent or $21 per month." The parties were then requested to send the Panel a brief outline of arguments in support of their respective positions. If, after studying these briefs, a further meeting seemed advisable, the Panel said it would so notify the parties.

Briefs were received by the Panel by April 21. On the basis of these briefs the Panel deemed it advisable to hold a meeting with the parties, and such a meeting was arranged for Friday, May 2, in Oak Ridge. Since this meeting was for the purpose of further exploring the issues in dispute and to mediate a settlement if possible, only one member of the Panel was required to make the trip. Dr. Edwin E. Witte represented the Panel at these meetings.

Through the mediation efforts of Dr. Witte, settlement was reached at the May 2 meeting. An agreement was reached on the wage issue within the permissible limits of wage stabilization regulations. In addition, a grievance with regard to vacations for the more senior employees was settled.

This case is now closed.

CASE NO. 44. AEC INSTALLATION: Los Alamos, N. Mex.; PARTIES: Zia Co.; International Brotherhood of Electrical Workers, AFL, Local 611

On March 27, 1952, the Panel received a telegram, signed jointly by the Business Manager of Local 611, International Brotherhood of Electrical Workers, and the Personnel Director of the Zia Co. at Los Alamos, requesting the Panel to assume jurisdiction over a dispute involving wage rates of certain employees in the Los Alamos power plant. The Panel replied by asking each party to submit a written outline of the issues in dispute, and their respective arguments in support of each issue.

Upon receipt of these briefs, the Panel sent telegrams to the parties taking official jurisdiction of the dispute.

On April 22, 1952, the parties were sent a document entitled "A Preliminary Understanding of Facts and Arguments." In one section of this document, the Panel outlined its understanding of the facts which were agreed to by the parties. In another section it discussed those facts which appeared to be in dispute because of conflicting testimony submitted by the parties. In a final section the Panel summarized its understanding of the issues in dispute, pointing up the apparent chief causes of disagreement. The pertinent paragraphs of this section are quoted below:

"The essence of the dispute appears to be the company's desire to bring its wages in the power plant into closer relationship to those paid by Public Service for comparable work. The Union argues that the historical relationship has not been with Public Service, but with construction rates paid at Los Alamos.

"The union's key arguments are that the historical relationship of operators to construction electricians should not be disturbed, and that in any case the Zia Co. cannot provide security which will make its jobs comparable to those of a public utility.

"The company's key arguments are that construction rates should not be paid in a power plant. Admitting that it cannot provide the kind of security that a public utility can, it believes that its estimated 30-cent differential should be adequate compensation for the difference in security and location."

The Panel then requested the parties to send their comments concerning the Panel's understanding of the dispute as indicated by this document. These comments were received by April 25.

On May 4 this dispute was discussed at a Panel meeting in New York City and at that time Dr. Dunlop was com-

missioned to explore further mediation possibilities. On May 22, Dr. Dunlop reported to the Panel that no agreement could be reached. After full discussion of the facts and arguments, the Panel then issued its recommendations.

As of May 31, this case is still open.

CASE NO. 45. AEC INSTALLATION: Chicago, Ill.: PARTIES: Argonne National Laboratory; International Guards Union of America, Local No. 1.

On May 14, 1952, the Panel received a telegram from Local 1, International Guards Union of America, announcing that a strike would take place on May 19 because of the inability of the Union to correct certain alleged grievances at the Argonne National Laboratory in Chicago.

The Panel replied by telegram reminding the International President of the Union of the Union's pledge not to strike in atomic energy installations before full Panel procedures have been exhausted. On the same day, the Panel received a reply from President MacDonald indicating that the strike had been called off and that the status quo would be preserved while the Panel retained jurisdiction.

Panel member Edwin E. Witte accepted responsibility for this dispute. As of May 31, it was in the mediation stage.

WILLIAM H. DAVIS, *Chairman*
FRANK P. DOUGLASS, *Member*
JOHN T. DUNLOP, *Member*
AARON HORVITZ, *Member*
GODFREY P. SCHMIDT, *Member*
EDWIN E. WITTE, *Member*
DONALD B. STRAUS, *Secretary*

APPENDIX 8

PUBLICATIONS OF THE UNITED STATES ATOMIC ENERGY COMMISSION [1]

In general, the AEC has encouraged project scientists to make their own arrangements for the publication of nonsecret research results in the established journals of scientific and technical communication. There are, however, a number of special publications concerning atomic energy which the AEC has sponsored or helped sponsor which are available to the general public.

SEMIANNUAL REPORTS TO CONGRESS

The semiannual reports which the AEC is required to make to the Congress are also made available to the public. These describe the progress in various phases of the Commission's program. An alternate title, indicating the principal subject of the report, has been given to each of the later reports. Indexes to all except this, the Twelfth Semiannual Report, are now available.[2]

First Semiannual Report, January 1947.

Second Semiannual Report, July 1947.

Third Semiannual Report, January 1948.

Fourth Semiannual Report, *Recent Scientific and Technical Developments in the Atomic Energy Program of the United States*, July 1948. 35 cents.

Fifth Semiannual Report, *Atomic Energy Development, 1947–1948*, January 1949. 45 cents.

Sixth Semiannual Report, *Atomic Energy and the Life Sciences*, July 1949. 45 cents.

Seventh Semiannual Report, *Atomic Energy and the Physical Sciences*, January 1950. 50 cents.

Eighth Semiannual Report, *Control of Radiation Hazards in the Atomic Energy Program*, July 1950. 50 cents.

Ninth Semiannual Report, *AEC Contract Policy and Operations*, January 1951. 40 cents.

Tenth Semiannual Report, *Major Activities in the Atomic Energy Programs. January–June 1951*, July 1951. 35 cents.

Eleventh Semiannual Report, *Some Applications of Atomic Energy in Plant Science*, January 1952. 50 cents.

Index to the Semiannual Reports to Congress, January 1947–January 1951, April 1951. 20 cents.

Index to the Tenth Semiannual Report to Congress, November 1951. 10 cents.

Index to the Eleventh Semiannual Report to Congress, May 1952. 10 cents.

GENERAL REPORTS AND GUIDES

Selected Readings on Atomic Energy, August 1951, is a bibliography of official publications, books, magazines, pamphlets and teaching units for educators, and indexes and bibliographies on atomic energy, 23 pages, 15 cents.[2]

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[1] Listed as of May 31, 1952.

[2] Available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Isotopes—A 3-Year Summary of Distribution—With Bibliography of Uses, August 1949, summarizes the Oak Ridge isotopes production, distribution, and training program, with statistics on the distribution and use of isotopes by state and institution, by field of use, by foreign country, and contains an extensive bibliography of published literature on isotopes, 201 pages, 45 cents.[2]

Isotopes—A 5-Year Summary of United States Distribution, August 1951, is a detailed account of isotope utilization during the first 5 years of the Commission's distribution program.[2]

Prospecting for Uranium, revised October 1951, is a nontechnical booklet prepared by the United States Geological Survey and AEC describing the uranium-bearing minerals, where to look for them, and instruments to use in prospecting and in laboratory testing and analysis of ores. It contains six color plates of principal minerals. Laws, regulations, and price schedules for uranium-bearing ores are included, 128 pages, 45 cents.[2]

Contracting and Purchasing Offices and Types of Commodities Purchased, revised March 1951, lists the types of items the AEC must procure, procurement officers, and location of the purchasing offices. Included are responsibilities of the AEC operations offices and major research centers for whom the materials are procured, and security requirements that must be met by firms supplying certain materials to AEC, 20 pages, 15 cents.[2]

A Guide for Contracting of Construction and Related Engineering Services, revised January 1951, gives AEC policy on awarding contracts for construction and architect-engineering services, procedures followed when requests for bids are formally advertised and when contracts are negotiated. Operations offices and officials responsible for letting such contracts are listed, 16 pages, 15 cents.[2]

TECHNICAL PUBLICATIONS, PERIODICALS, AND CATALOGS

The items listed below, together with the National Nuclear Energy Series described in the next section, are the publications of scientific and technical interest.

Sourcebook on Atomic Energy, Samuel Glasstone, D. Van Nostrand Co., N. Y., 1950, presents a comprehensive, technical description of the theory, history, development, and uses of atomic energy. Chapters are included on the structure of the atom, radioactivity, isotopes, neutron research, acceleration of charged particles, and other phases of nuclear science, 546 pages, $3.40.

The Effects of Atomic Weapons, 1950, prepared for the Department of Defense and the AEC by a board of editors under the direction of the Los Alamos Scientific Laboratory, presents a technical summary of the results to be expected from the detonation of atomic weapons, with chapters describing an atomic explosion, the shock from air, underwater, and underground bursts; blast, radiation, and fire effects; methods of protecting personnel; and decontamination methods, 456 pages, $1.25.[2]

Handbook on Aerosols, 1950, contains chapters from the National Defense Research Committee Summary Technical Report, Division 10, declassified by the Army at the request of AEC, on the properties and behavior of aerosols, principals and instruments used in meteorology studies, and information useful in studies of the disposal of gaseous radioactive wastes, the dispersal of insecticides, the disposal of industrial gases, etc., 147 pages, 60 cents.[2]

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[2] Available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Handbook on Air Cleaning, 1951, a compilation of data resulting from the study of air cleaning equipment and procedures. Such studies applied principally to the removal of radioactive dust and contamination from exhaust gases, etc. (in process)[2]

Liquid-Metals Handbook, R. N. Lyon, et al. (being revised), compiled by the Department of the Navy and AEC, summarizes current information on the physical and chemical properties of liquid metals, their present industrial uses, and their use and potentialities as heat-transfer media. 188 pages, $1.25.[2]

Manual of Aanalytic Methods for the Determination of Uranium and Thorium in Their Ores, C. J. Rodden and J. J. Tregoning, 1950, presents a number of tested methods of analyzing ore samples for their uranium and thorium content. It is intended to be an aid to assayers, commercial laboratories, and others interested in raw material assay work, 55 pages, 20 cents.[2]

Handling Radioactive Wastes in the Atomic Energy Program, revised August 1951, reports on the sources and types of radioactive wastes in atomic energy operations, methods developed for their safe handling and disposal, and methods specified for the safe handling of radioisotopes by private users, 30 pages, 15 cents.[2]

Trilinear Chart of Nuclear Species, W. H. Sullivan, John Wiley & Sons, Inc., N. Y., 1949, shows physical data for all the nuclear species known as of June 1949, $2.50.

Periodicals and Catalogs

Nuclear Science Abstracts, issued twice a month by the AEC Technical Information Service, contains abstracts of all current AEC declassified and unclassified reports, of non-AEC reports related to atomic energy, and of articles appearing in both the foreign and domestic periodical literature, $6 per year.[2]

Guide to Russian Periodical Literature, a title list prepared by the Brookhaven National Laboratory of available current scientific papers and with complete translations of significant articles, 20 cents.[3]

Isotopes—Catalog and Price List, Isotopes Division, United States Atomic Energy Commission, Oak Ridge, Tenn., March 1951, lists and describes radioactive and stable isotopes available from Oak Ridge, and includes prices and instructions for ordering the isotopes.

Radiation Instrument Catalog No. 2, 1950, compiled by the Radiation Instruments Branch, AEC, lists most of the commercially available radiation instruments, accessories, and components, $2.[3]

THE NATIONAL NUCLEAR ENERGY SERIES

These volumes were written by the scientists who performed the research and development on the atomic energy enterprise under the Manhattan Engineer District and later under the Atomic Energy Commission. The following volumes have been published for the AEC by the McGraw-Hill Book Co., New York, N. Y.

[2] Available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

[3] Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

Division I: The Electromagnetic Separation Process

Vacuum Equipment and Techniques, vol. 1, edited by A. Guthrie and R. K. Wakerling, 1949, describes the development and study of high vacuum equipment and high vacuum systems for the large-scale separation of isotopes by the electromagnetic process, 264 pages, $3.65.

The Characteristics of Electrical Discharges in Magnetic Fields, vol. 5, edited by A. Guthrie and R. K. Wakerling, 1949, covers most of the significant studies by the University of California Radiation Laboratory on electrical discharges with emphasis on studies of electrical discharges in vapors of uranium compounds, 376 pages, $5.00.

Division II: Gaseous Diffusion Project

Engineering Developments in the Gaseous Diffusion Process, vol. 16, edited by M. Benedict and C. Williams, 1949, describes a number of mechanical, electrical, and chemical engineering developments related to the operation and handling of materials used in the gaseous diffusion process—principally special plant instruments, vacuum engineering, development of heat-transfer equipment, and absorption of uranium hexafluoride and fluorine, 129 pages, $2.00.

Bibliography of Research on Heavy Hydrogen Compounds, vol. 4C, compiled by A. H. Kimball, edited by H. C. Urey and I. Kirschenbaum, 1949, contains about 2,000 references to published literature on research with heavy hydrogen. References are arranged by subject with an index of the hydrogen compounds and authors, 350 pages, $4.75.

Division III: Special Separations Project

The Theory of Isotope Separation, vol. 1B, by Karl Cohen, 1951, presents the theory of cascades as generally applicable to the problems of isotope separation. Different types of centrifuges and other methods of separation are also discussed, 165 pages, $2.50.

Spectroscopic Properties of Uranium Compounds, vol. 2, edited by G. H. Dieke and A. B. F. Duncan, 1949, presents data compiled from a comprehensive study of the absorption and fluorescence spectra of uranium compounds and describes the experimental techniques used in the studies, 290 pages, $4.25.

Physical Properties and Analysis of Heavy Water, vol. 4A by I. Kirschenbaum, 1951, describes the physical properties of heavy water, chemical equilibria or exchange reactions and methods of isotopic analysis, 438 pages, $6.00.

Division IV: Plutonium Project

Radiochemical Studies: The Fission Products, vol. 9, edited by C. D. Coryell and N. Sugarman, 1951, presents 336 original research papers on the techniques and results of radiochemical studies of uranium and plutonium fission products, 2,086 pages (in 3 parts), $27.00.

The Transuranium Elements, Research Papers, vol. 14B, edited by G. T. Seaborg, J. J. Katz, and W. M. Manning, 1949, includes 163 research papers on neptunium, plutonium, americium, curium, and several of the heavy elements related to them, and historical summaries of transuranium element research, 1,733 pages (in 2 parts), $23.00.

The Chemistry and Metallurgy of Miscellaneous Materials; Thermodynamics, vol. 19B, edited by L. L. Quill, 1949, contains 10 research papers on thermodynamic properties of the elements and several of their compounds, 329 pages, $4.50.

Industrial Medicine on the Plutonium Project, vol. 20, edited by R. S. Stone, 1951, describes the medical program established for the care and protection of workers on the plutonium project, 511 pages, $7.00.

Biological Effects of External Beta Radiation, vol. 22E, edited by R. E. Zirkle, offers a collection of original reports on the effects of beta rays applied to the surface of the mammalian body, 242 pages, $3.50.

Histopathology of Irradiation from External and Internal Sources, vol. 22I, edited by W. Bloom, 1948, is an advanced treatise on the histopathological and cytological effects of total-body irradiation, 808 pages, $10.50.

Toxicology of Uranium, vol. 23, edited by A. Tannenbaum, 1950, describes the studies made on the distribution, accumulation, excretion, and chemical and physiological effects of uranium and uranium compounds in the animal body, 323 pages, $4.65.

Division V: Los Alamos Project

Electronics: Experimental Techniques, vol. 1, edited by W. C. Elmore and M. L. Sands, 1948, describes a number of complete circuits and circuit elements developed at Los Alamos for making nuclear and other physical measurements, 417 pages, $5.50.

Ionization Chambers and Counters: Experimental Techniques, vol. 2, edited by B. Rossi and H. Staub, 1949, describes the physical principles of ionization chambers and counters, and includes previously unpublished project developments by scientists at the Los Alamos Laboratory, 243 pages, $3.25.

Miscellaneous Physical and Chemical Techniques of the Los Alamos Project, vol. 3, edited by A. C. Graves and D. K. Froman, describes a variety of laboratory techniques used at Los Alamos in early studies. Drawings and diagrams of the laboratory apparatus are given, 323 pages, $4.25.

Division VI: University of Rochester Project

Pharmacology and Toxicology of Uranium Compounds, parts I and II, vol. I, edited by C. Voegtlin and H. C. Hodge, 1949, summarizes the results of 3 years' research on the toxicity of uranium compounds and the mechanism of uranium poisoning, and includes a section on the toxicology of fluorine and hydrogen fluoride, 1,084 pages (in 2 parts), $14.00.

Biological Studies with Polonium, Radium and Plutonium, vol. 3, edited by R. M. Fink, 1949, describes the studies made of the biological effects of these alpha-emitting elements in the animal body, air monitoring precautions, and equipment used in atomic energy laboratories where work with these elements is carried on, 411 pages, $5.50.

Division VII: Materials Procurement Project

Preparation, Properties, and Technology of Fluorine and Organic Fluoro Compounds, vol. 1, edited by C. Slesser and S. R. Schram, describes developments in the large-scale manufacture of fluorine, and purifying and handling fluorine. It describes the preparation and the chemical and physical properties of various fluorocarbon compounds, 868 pages, $11.50.

Division VIII: Manhattan Project Chemistry

Analytical Chemistry of the Manhattan Project, vol. 1, edited by C. J. Rodden, 1950, describes methods of analyzing the many different materials used in the atomic energy project—with emphasis on analytical methods for the determination of uranium and thorium, 748 pages, $10.00.

Chemistry of Uranium. Part I. The Element, Its Binary and Related Compounds, vol. 5, by J. J. Katz and E. Rabinowitch, 1951, is a detailed discussion of the physical and chemical properties of uranium, its occurrence in nature and extraction from ores, and preparation and physical properties of its binary compounds, 609 pages, $8.25.

APPENDIX 9

Patents Issued to the Commission Which Are Available for Licensing [1]

The following 77 United States Letters Patents owned by the United States Government as represented by the United State Atomic Energy Commission have been made available for licensing and are supplemental to the 348 listed in the Tenth and Eleventh Semiannual Reports. Licenses are granted on a non-exclusive, royalty-free basis. Abstracts of patents available for licensing are published in the United States Patent Office Official Gazette.

PATENT NO.	TITLE	INVENTOR
2,577,066	Pressure Measuring Device	W. A. Arnold, Oak Ridge, Tenn.
2,577,097	Method for Separation of Americium from Solutions Containing the Same.	L. B. Werner, Berkeley, Calif.
2,577,514	Method for Removal of Radioactive Contaminants.	J. De Ment, Portland, Oreg.
2,577,696	Electrical Positioning Proportional Floating Control.	T. A. Abbott, La Grange, Ill. and J. B. McMahon, Wilmette, Ill.
2,577,707	Pulse Transformer	Q. A. Kerns and W. R. Baker, Berkeley, Calif.
2,578,416	Method of Making Neptunium Chlorides	S. Fried, Chicago, Ill. and N. R. Davidson, Sierra Madre, Calif.
2,578,908	Electrostatic Generators	C. M. Turner, Richmond, Calif.
2,579,223	Regulated Power Supply	W. R. Baker, Berkeley, Calif.
2,579,225	Adjustable Support for Spectrometer Reflector.	L. B. Borst and R. J. Fox, Oak Ridge, Tenn.
2,579,231	Electromagnetically Operated Counter	H. D. Goldberg and M. I. Goldberg, New York, N. Y.
2,579,234	Vacuum Seal for Fluorine Generation System.	D. O. Hubbard, Niagara Falls, N. Y.
2,579,235	Rectifier System	Q. A. Kerns, Berkeley, Calif.
2,579,243	Methods for the Production of Radioactive Isotopes.	A. F. Reid, New York, N. Y.
2,579,994	Neutron Density Indicator Devices	W. H. Zinn, Chicago, Ill.
2,580,349	Method of Forming Uranium Carbide	R. W. Fisher, Ames, Iowa.
2,580,357	Apparatus for the Preparation of Metal Halides.	B. McDuffie, Princeton, N. J., A. D. Schelberg, New York, N. Y., and R. W. Thompson, Minneapolis, Minn.
2,580,358	Methods for Storing Perhaloacetyl Peroxide and Stabilized Perhaloacetyl Peroxide.	W. T. Miller, Ithaca, N. Y., A. L. Dittman, Jersey City, N. J., and S. K. Reed, Lewisburg, Pa.
2,580,360	X-ray Shields	P. Morrison, Pittsburgh, Pa.
2,580,373	Process for Preparing Perhaloacetyl Peroxide.	C. Zimmerman, Brooklyn, N. Y.
2,581,863	Process for Electrodepositing Uranium Dioxide.	M. Kahn, Berkeley, Calif.
2,582,163	Electrometers for Pocket Chambers	T. A. Rich and J. E. Bigelow, Schenectady, N. Y.
2,582,941	Processes of Producing Uranium Chlorides	C. D. Wilder, Oak Ridge, Tenn.
2,583,121	Mass Spectrometer Ion Sources	F. L. Reynolds, San Francisco, Calif.
2,583,469	Calibration Units for Cathode-Ray Tubes	M. E. Chun, Berkeley, Calif.
2,584,801	Pipe Extractor	S. L. Handforth, Wilmington, Del.
2,584,816	Electroplating Control System	M. L. Sands, Everett, Mass.
2,585,639	Compensated Electron Discharge Measuring Device.	W. C. Elmore, Springfield Township, Pa.
2,585,644	Process for Producing Fluorocarbons	R. D. Fowler, W. B. Burford, III, and H. C. Anderson, Baltimore, Md.
2,585,649	Reaction Comparison Apparatus	A. O. Hanson, Grand Forks, N. Dak.
2,585,679	High Voltage Regulator	J. Priedigkeit, Oakland, Calif.
2,585,702	Spectrometer	R. W. Thomsson, Minneapolis, Minn., and W. T. Leland, New York, N. Y.
2,585,901	Method of Isotope Analysis	G. H. Dieke, Baltimore, Md.
2,586,027	Casting Apparatus	C. F. Gray, Baton Rouge, La.
2,586,550	Halogen-Substituted Acetyl Peroxide Catalyst for Halo-Olefin Polymerization.	W. T. Miller, Ithaca, A. L. Dittman, Schenectady, N. Y., and S. K. Reed, Lewisburg, Pa.
2,586,984	Apparatus for Governing Fluid Flow	A. O. C. Nier, Riverdale, N. Y., R. B. Thorness and C. M. Stevens, New York, N. Y.
2,587,426	Pulse Forming Network	W. R. Aiken, Berkeley, Calif.
2,587,919	Electrical Apparatus for Simulating the Time Dependent Response for Characteristic of Neutronic Reactors.	H. A. Straus, Baltimore, Md., P. R. Bell, Jr., and F. H. Murray, Oak Rige, Tenn.

[1] Patents listed as of May 31, 1952. Applicants for licenses should apply to the Chief, Patent Branch, Office of the General Counsel, USAEC., Washington 25, D. C., identifying the subject matter by patent number and title.

PATENT NO.	TITLE	INVENTOR
2,588,041	Separation of Metal Values in Fluoride Compositions.	M. A. Perkins, and M. Couper, Wilmington, Del.
2,588,153	Method of Making Metal Hydride	A. S. Newton, Berkeley, Calif.
2,588,466	Electrical Generator	A. H. Barnes, Downers Grove, Ill.
2,588,564	Thermoelectrically Balanced Meter Network	G. S. Pawlicki, Urbana, Ill.
2,588,734	Pretreatment of Beryllium Prior to Coating	M. Kolodney, New York, N. Y.
2,588,789	Neutron Detector	W. H. Zinn, Chicago, Ill.
2,589,391	Boron Chloride Production from an Alloy of Boron with Tantalum.	C. A. Hutchinson, Jr., and J. S. Smith, New York, N. Y.
2,590,057	Half-Life Determining Method	C. E. Wiegand, Oakland, Calif.
2,590,426	Processes for Photochemical Chlorination of Hydrocarbons.	A Loverde, Niagara Falls, N. Y.
2,590,826	Oscillator Control Relay Circuits	R. T. Schenck, Lower Mound Bethel Township, Pa.
2,590,925	Proportional Counter	C. J. Borkowski and E. Fairstein, Oak Ridge, Tenn.
2,591,247	Coincidence Amplifiers	H. D. Farnsworth, Berkeley, Calif.
2,591,998	Leak Detectors	W. R. Baker, Berkeley, Calif.
2,592,416	Indicating Devices for Radioactivity Intensity.	E. J. Groth, Jr., St. Louis, Mo.
2,593,948	Distributed Coincidence Circuit	C. E. Wiegand, Oakland, Calif. and O. Chamberlain, Berkeley, Calif.
2,594,618	Thermal Flowmeter	E. T. Booth, Jr., New York, N. Y.
2,594,668	Flowmeter	M. Clifford, Schnectady, N. Y.
2,594,703	Photomultiplier Tube Circuit	L. F. Wouters, Oakland, Calif.
2,594,970	Viewing Device for Radioactive Materials	G. S. Monk, Chicago, Ill.
2,594,989	Magnetic Contouring System	W. M. Powell, Berkeley, Calif.
2,595,134	Universal Manipulator for Grasping Tools	C. M. Gordon, San Pablo, Calif.
2,595,550	Radiation Counter	J. A. Simpson, Jr., Chicago, Ill.
2,595,552	Photomultiplier Coincidence Circuit	R. E. Thomas, Berkeley, Calif.
2,595,611	Ionization Gauge	K. M. Simpson, Santa Barbara, Calif., W. R. Baker, and Q. A. Kerns, Berkeley, Calif.
2,595,622	Fission Indicator	C. E. Wiegand, Oakland, Calif.
2,595,924	Quaternary Bismuth Alloy	O. N. Carlson and H. A. Wilhelm, Ames, Iowa
2,595,925	Quaternary Bismuth Alloy	O. N. Carlson and H. A. Wilhelm, Ames, Iowa
2,596,047	Uranium-Aroyl Aldehyde Complexes and Method of Making Same.	H. I. Schlesinger, Chicago, Ill., and H. C. Brown, Detroit, Mich.
2,596,080	Ionization Chamber	J. R. Raper and R. E. Zirkle, Chicago, Ill.
2,596,084	Fluorinated Compounds and Process of Producing Same.	P. E. Weimer, West Lafayette, Ind.
2,596,529	Vibration Measuring Device	H. F. Clarke, Pullman, Wash.
2,596,530	Vibration Measuring Device	H. F. Clarke, Pullman, Wash.
2,596,531	Vibration Measuring Device	H. F. Clarke, Pullman, Wash.
2,596,956	Electronic Relay Circuit	L. G. Nierman, Chicago, Ill.
2,596,500	Pocket Radiation Alarm	E. W. Molloy, Wilman, Calif.
2,597,535	Radioactive Assay Apparatus	E. G. Segre, Berkeley, Calif.
2,597,596	Insulator Bushing Seal	J. D. Reid, Oak Ridge, Tenn.
2,598,215	Ionization Chamber	C. J. Borkowski and R. H. Firminhac, Oak Ridge, Tenn.
2,598,283	Copolymers of Perfluoropropene and Tetrafluoroethylene and Method of Making Same.	W. T. Miller, Ithaca, N. Y.
2,598,411	Rearrangement of Saturated Halocarbons	W. T. Miller, Ithaca, N. Y. and E. W. Fager, Chicago, Ill.

APPENDIX 10

AMENDMENT TO THE ATOMIC ENERGY ACT OF 1946[1]

PUBLIC LAW 298—82D CONGRESS
CHAPTER 159—2D SESSION
S. 2077

AN ACT

To provide for certain investigations by the Civil Service Commission in lieu of the Federal Bureau of Investigation, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That sections 10 (b) (5) (B) (i) and (B) (ii) of the Act of August 1, 1946 (60 Stat. 755), entitled "An Act for the development and control of atomic energy"; section 1 (2) of the Act of May 22, 1947 (61 Stat. 103), entitled "An Act to provide for assistance to Greece and Turkey"; section 1 of the joint resolution of May 31, 1947 (61 Stat. 125), entitled "Joint resolution providing for relief assistance to the people of countries devastated by war"; section 3 (e) of the Act of August 5, 1947 (61 Stat. 780), entitled "An Act to provide for the reincorporation to The Institute of Inter-American Affairs, and for other purposes"; section 1001 of the Act of January 27, 1948 (62 Stat. 6), entitled "An Act to promote the better understanding of the United States among the peoples of the world and to strengthen cooperative international relations"; section 110 (c) of the Act of April 3, 1948 (62 Stat. 137), entitled "An Act to promote world peace and the general welfare, national interest, and foreign policy of the United States through economic, financial, and other measures necessary to the maintenance of conditions abroad in which free institutions may survive and consistent with the maintenance of the strength and stability of the United States"; section 2 of the Act of June 14, 1948 (62 Stat. 441), entitled "Joint resolution providing for membership and participation by the United States in the World Health Organization and authorizing an appropriation therefor"; section 3 of the Act of June 30, 1948 (62 Stat 1151), entitled "Joint resolution providing for acceptance by the United States of America of the Constitution of the International Labor Organization Instrument of Amendment, and further authorizing an appropriation for payment of the United States share of the expenses of membership and for expenses of participation by the United States"; subsection (c) of section 15 of the Act of May 10, 1950 (64 Stat. 149), entitled "An Act to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes"; section 3 (e) of the Act of August 11, 1950 (64 Stat. 438), entitled "An Act to authorize the District of Columbia government to establish an Office of Civil Defense, and for other purposes"; and section 510 of the Mutual Security Act of 1951, are amended by striking therefrom, wherever they appear, the words "Federal Bureau of Investigation" and inserting in lieu thereof the words "Civil Service Commission": *Provided*, That in the event an investigation made pursuant to any of

[1] Previous amendments to the Atomic Energy Act of 1946 can be found in Appendix 10 of Ninth Semiannual Report to Congress, January 1951, and Eleventh Semiannual Report to Congress, January 1952.

the above statutes as herein amended develops any data reflecting that the individual who is the subject of the investigation is of questionable loyalty, the Civil Service Commission shall refer the matter to the Federal Bureau of Investigation for the conduct of a full field investigation, the results of which shall be furnished to the Civil Service Commission for its information and appropriate action: *Provided further*, That, if the President deems it to be in the national interest, he may from time to time cause investigations of any group or class which are required by any of the above statutes, to be made by the Federal Bureau of Investigation rather than the Civil Service Commission: *Provided further*, That notwithstanding the provisions of section 10 (b) (5) (B) (i) and (ii) of the Atomic Energy Act of 1946 and section 510 of the Mutual Security Act of 1951, as amended by this Act, a majority of the members of the Atomic Energy Commission, the Director of Mutual Security, or the Secretary of State, as the case may be, shall certify those specific positions which are of a high degree of importance or sensitivity, and upon such certification the investigation and reports required by such provisions or by any other laws amended by the first section of this Act shall, in the case of such positions, be made by the Federal Bureau of Investigation rather than the Civil Service Commission.

SEC. 2. The transfer of investigative functions hereinbefore provided for shall be effectuated during the period commencing with the date of the approval of this Act and terminating one hundred and eighty days thereafter, it being the intent of the Congress that the said transfer be effectuated as expeditiously within that period of time as the Civil Service Commission shall consider the facilities of that Commission adequate to undertake all or any part of the functions herein transferred: *Provided, however*, That investigations pending with the Federal Bureau of Investigation at the expiration of the one hundred and eighty days shall be completed in due course by that Bureau and reports thereof furnished to the Civil Service Commission for its information and appropriate action.

SEC. 3. Nothing in this Act shall be construed to affect in any way the responsibility of the Federal Bureau of Investigation for investigations of espionage, sabotage, or subversive acts.

SEC. 4. In order to carry out the provisions and purposes of this Act, appropriations available to the departments or agencies, on whose account investigations are made pursuant to the statutes amended by section 1 of this Act, shall be available for advances or reimbursements directly to the applicable appropriations of the Civil Service Commission, or of the Federal Bureau of Investigation, for the cost of investigations made for such departments or agencies.

Approved April 5, 1952.

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