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ANNUAL REPORT

FOR THE FISCAL YEAR ENDED JUNE 30

*SECRETARY OF THE*  
**INTERIOR**

*DOUGLAS McKAY*

*Resources for Tomorrow*



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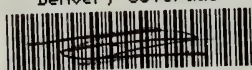
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UNITED STATES  
DEPARTMENT OF THE INTERIOR

Douglas McKay, *Secretary*

Published by the Government Printing Office



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THE SECRETARY OF THE INTERIOR  
WASHINGTON

MY DEAR MR. PRESIDENT: I transmit herewith the Annual Report of the Department of the Interior for the fiscal year which ended June 30, 1954.

In addition to reviewing the principal activities of the Department's various bureaus and offices, this report also provides a brief evaluation of these activities in terms of their significance in helping to meet future resource requirements. While the report indicates that substantial progress is being made, many natural resource problems continue to require special attention. We shall continue to work earnestly and creatively to insure that the resource needs of tomorrow as well as those of today are fully and efficiently met.

Sincerely yours,

*Secretary of the Interior.*

THE PRESIDENT,  
THE WHITE HOUSE,  
Washington, D. C.



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*PART I*

RESOURCES FOR TOMORROW



# Resources for Tomorrow



TO THE Department of the Interior, the Nation has given the primary Federal responsibility for the conservation and development of its natural resources.

This is a crucially important task. The future welfare of our people may well depend on how wisely we conserve, how soundly we develop our basic resources of water, land, minerals, and energy sources. When our resource problems are considered on a truly long-term basis, moreover, our very survival as a civilization may be said to hinge upon the future adequacy of our natural resources.

Inherent in the concept of conservation is concern for the future. Our resources are not inexhaustible. As our Nation continues to grow the demands upon these resources will continue to expand at a tremendous rate.

Some of our resources—such as minerals, oil, gas, and coal—are nonrenewable. Once used they are gone forever. At the same time we should remember that only by using them can we continue to expand our economy.

Other resources such as land can lose their productivity unless we practice sound conservation. Still others, like our water resources, are renewable.

In looking ahead to the needs of the future we must give the needed emphasis to development of new sources of wealth as well as to conservation of what we have. The concept of conservation in the sense of hoarding or locking up our resources, in fact, is a negative one. If pursued to its logical extremes, it would mean a halt in our progressive growth as a Nation and as a prosperous people.

Actually, one of the most vital aspects of our modern history has been the finding and developing of new sources of wealth. Hand in hand with conservation must go a vigorous effort to develop new materials, new sources of energy, to replace those which face ultimate exhaustion.

## *Future Resource Problems*

With regard to all of our basic resources, indeed, it is clear that the future will bring difficult and complex problems.

As our needs for fertile acreage grow, we must carry out necessary programs for reclamation of arid and semiarid lands, using both our water and our land in the most efficient manner.

We must develop efficient, low-cost methods of processing secondary mineral deposits and reclaiming wasted sources, as well as find new materials and substitutes to fill the gap left as our better mineral sources are exhausted.

As our demands for energy continue to increase, we must assure the wisest use of our exhaustible supplies of fossil fuels such as oil, gas, and coal. Hydroelectric developments should assume their proper role, although the hydroelectric potential is at best only a small proportion of the total energy requirements. Before too long, atomic energy may be expected to contribute to our supply. And, ultimately, we may turn to the energy of the sun and the tides as a last, long-term source.

Many of these problems lie far in the future. The United States more than any Nation in the world has been blessed with a bounteous supply of nearly all the resources required to continue to increase the usable wealth of its people. Yet even today we can see already the value of conservation practices—followed during recent past decades—which have preserved valuable resources for our present use.

### *Long-Term Programs Needed*

When the ever-accelerating pace of our consumption of natural resources is considered, in fact, it is more than ever apparent that we must begin preparing today for problems that, while still years in the future, can be met successfully only if we look ahead and develop now the long-term programs that are required.

It is not an easy task to prepare to meet problems that may not become critical until the day when our children or our children's children come of age. We have immediate concerns that absorb our attention, decisions that must be made on the basis of our present inadequate knowledge of the full scope of tomorrow's needs.

Nevertheless, to the maximum extent possible, all of the Interior Department's many and varied activities have been directed to contributing to the conservation and development of the Nation's resources so that they will serve the needs of future generations.

### *A Mutual Undertaking*

The primary role in the development of the Nation's resources has always been assumed by private individuals rather than by the Government. That has been the historic American way. The role of the Department of the Interior is one of providing guidance and leadership through research and the effective accomplishment of its specific responsibilities assigned by Congress. The task ahead is so great that



it can be approached only as a mutual undertaking involving the cooperative teamwork of the Federal, State and local agencies and—most basic of all—the initiative of individual citizens.

### *Evaluation of Present Activities*

This report attempts to provide a brief, practical evaluation of the Department's major activities indicating how they are being directed to serve future needs and how they are being shaped in response to changing resource demands.

Many questions admittedly must remain unanswered, except to indicate the line of approach which is presently being pursued. In other cases, even fundamental questions may remain unasked because the problems are still unanticipated or only vaguely sensed. No one claims to have all the answers. We do claim merely that we are making substantial progress toward meeting those needs of tomorrow that we know or can visualize, and that our nation and industrial society are well prepared, from a resources standpoint, to meet the future.

## WATER AND POWER

Life itself is impossible without water, and it is fortunate that water is a resource that is constantly renewed.

On how effectively we control the water which falls on our hills and plains, however, depends a host of key resource responsibilities. Untamed and unharnessed, our water can be a destructive enemy. It may erode away our fertile acreage, and bring floods to destroy our cities.

When intelligently controlled, however, water can bring productive wealth in many ways.

The angry spring floods can be stored in vast reservoirs for release in later periods of shortage to bring fertility to otherwise arid lands. The mighty surge of our great rivers can be harnessed to provide electric power for our homes and industries.

The more quiescent flow of other streams and rivers can be controlled and spread so that the precious water is stored underground for later withdrawal.

### *Origins of Reclamation Policy*

For more than a century, continuing development of our water resources has been recognized as essential to national economic advancement, particularly in the arid and semiarid Western States. This policy had its inception with the early Spanish explorers who followed

the trail blazed by the aboriginal Indian tribes in introducing extensive irrigation into the Southwest, and with the sagacious Mormon pioneers who in 1846 dug the first irrigation ditch bringing water to land in what was to become Salt Lake City, Utah.

Fifty-six years later, in 1902, President Theodore Roosevelt signed the Federal Reclamation Act, bringing into being the first major partnership in the development and beneficial use of this natural resource in the arid and semiarid regions of the United States.

It should be noted that when the Reclamation Act was passed the opportunities for homesteading were rapidly diminishing. Vast areas of productive land, such as that settled by the early pioneers, were no longer available. At the same time, with the increase of our population the need for an increased food supply was growing rapidly. The Reclamation Act, by opening up new land for agricultural development, therefore, was an important phase in the history of America's effort to provide resources for tomorrow.

It is significant that administration of the Federal reclamation law was vested in the Department of the Interior, where it remains today, thus affording a foundation for continuity in technical knowledge and practical experience in the planning, construction, and operation of reclamation projects containing such engineering features as the world's largest and highest dams, water-distributing canals, and hydroelectric powerplants.

### *Highlights of Progress*

Success of the Federal reclamation program is reflected in the service rendered in the 17 Western States. New or supplemental water has been supplied for more than 7 million acres of irrigable land on which settlers have established 125,000 farms. Another 1½ million persons live in nearby towns and villages which depend economically in a large measure upon the program. This land supplied with water from Bureau constructed works is about one-fourth the total irrigated area in the Western States. The other three-fourths has been irrigated by private initiative, acting through State and local agencies. The Bureau's activities aid in the more difficult and complex developments. In addition to supplying irrigation water, Bureau of Reclamation-constructed works provide municipal and industrial water service to over 2 million people.

Construction completed during the year added about 2 million acre-feet of storage capacity in new Bureau of Reclamation reservoirs, 700 miles of canals, pipelines, and laterals, almost 300,000 kilowatts of hydroelectric generating capacity, and 100 miles of major electric transmission lines.

The year was highlighted by completion of Canyon Ferry Dam, a large concrete dam on the Missouri River in Montana, and by the placing in service of its 50,000-kilowatt powerplant; by completion of Jamestown Dam, an earth dam in North Dakota, nearly a year ahead of schedule, the "holing through" of the 4½ mile long Eklutna Tunnel in Alaska, and the construction of irrigation facilities to serve about 55,000 acres of land on the Columbia Basin Project in Washington.

The 1955 construction program will provide for the completion of irrigation facilities to supply new and supplemental water supplies to an additional 290,000 acres of land and for an increased hydro-generating capacity of 241,500 kilowatts.

### *Future Reclamation Activities*

Looking at the future economic needs of the Nation, nearly 5 million acres of irrigated land can be added to the agricultural potentiality of the Western States, and nearly 700,000 kilowatts of hydroelectric generating capacity can be installed in plants on Bureau of Reclamation projects already authorized to be constructed by Congress.

In addition, the blueprint for continued development in the West, which will have its effect throughout the Nation, calls for the recommendation to Congress of legislation, cosponsored by local water resource interests and the Bureau of Reclamation, authorizing construction of such major undertakings, as the Colorado River Storage project, the Fryngpan-Arkansas project, and the Washita River Basin project.

The latter project would provide water for municipal and industrial use and for irrigation of 25,700 acres of land in Oklahoma; the Colorado River Storage plan would provide reservoir space for 47,355,000 acre-feet of water for irrigation and other purposes including the generation of 1,592,000 kilowatts in a five-State area, while the Fryngpan-Arkansas project would furnish water for 322,000 acres of land and the generation of 500,000 kilowatts of hydroelectric power in the eastern Colorado region.

The Department is giving its vigorous support to these projects which are essential to the development of important areas of the West. Other projects are under current investigation and in keeping with its affirmative reclamation program the Department intends to pursue actively the investigation of every desirable project, as funds are made available by Congress. Needed projects found to be feasible from an engineering standpoint and falling within the guideposts established by Congress will be firmly supported.

The record of reclamation activities belies any suggestion that this



essential program has been permitted to lag. The Upper Colorado River Storage Project alone is the most comprehensive and far-reaching undertaking for water resource development proposed in recent years. All in all, the reclamation program is moving ahead at a steady pace, with construction work, appropriations, and recommendations for the authorization of new projects all showing progress in fiscal 1954.

America is a home-building Nation. That trait is dramatically typified in the demand, particularly from veterans of service in the Armed Forces, for farm units made available by irrigation under the Reclamation program. Since the end of World War II a total of almost 2,000 farm units aggregating about 153,000 acres of land were made available for acquisition on 13 Bureau projects. Applications for farm units totalled almost 87,000, mostly from veterans.

### *Agricultural Production*

The 1953 harvest of crops in the service area of Federal reclamation projects was valued at \$785,939,868. This was the eighth consecutive year with crop values in excess of one-half billion dollars. It brought the cumulative value of the products produced by all reclamation projects from 1906 through 1953 to more than \$9.7 billion.

Tonnagewise, the 1953 harvest was the highest on record, 9 percent greater than the previous year and 80 percent larger than the harvest of ten years ago. In terms of acres, the most significant crops were hay and forage with 44.6 percent of the irrigated lands producing these crops.

The benefits accruing to the Nation through reclamation development are measured in terms of families served, crop production and value, livestock raised, increased population on and adjacent to projects, and in a wide variety of other ways.

These benefits filter to every State and every segment of society. They provide through this process additional economic stability to the Nation.

### *Partnership in Reclamation*

Emphasis on these achievements of the Federal reclamation program, however, must not lead us to ignore the major role played by private citizens, local communities, and State governments in the Western States. While in many instances they have been partners with the Federal Government in supplying irrigation water, in innumerable other cases local interests without any financial aid or assistance from the Federal Government have with their own resources transformed parched sagebrush desert into more than 19 million acres

of irrigated land, which contributed substantial benefits to the economy of the Nation.

The success of America's water resources conservation program depends upon the extent these local interests share in the responsibilities and opportunities for providing the Nation's resources for tomorrow. The Federal Government, and particularly the Department of the Interior, stands ready to contribute its full share to any partnership. The technical know-how amassed under the Federal reclamation program is at the service of the people of the Western States.

Guidance toward the goal of maximum beneficial use of the water resources is being formulated through the preparation of a national water policy, and through legislation which will be presented to Congress to permit effective cooperation between the Federal Government and local interests in the financing, planning, and development of water resources projects.

### *Power Needs of Northwest*

The Pacific Northwest is characterized by an abundance of water resources and paucity of other sources of energy. It lacks known deposits of petroleum or natural gas and has relatively small deposits of high-grade coal. But the Columbia River and its tributaries, gathering the flow of numerous streams originating in the snow-capped Rocky Mountains and Cascade range, contain the largest concentration of water power found in any drainage basin in the United States.

Only about 15 percent of the Columbia's 34 million kilowatt potential has been harnessed by dams built by the Federal Government, privately owned utilities, and public agencies. The vast bulk of the Columbia River system's energy potential and some of the best dam sites still remain to be used.

Total requirements, exclusive of new electro-process industries, are expected to jump from 29.5 billion kilowatt-hours in 1953 to 58 billion kilowatt-hours in 1963, or about 7 percent annually.

The economic development of the Pacific Northwest has been phenomenal in the past 15 years, but the future offers even greater promise. Power is a major key to the region's future prosperity, and the control of falling water to generate low-cost electricity must be the basis for the bulk of the additional energy supply.

The Western Group of the Northwest Power pool, whose service area includes Washington, most of Oregon, northern Idaho and parts of western Montana, presently has an installed capacity of 5,100,000 kilowatts. Of this total, 3,100,000 are in the 12 multipurpose projects



of the Federal system. Non-Federal hydroelectric capacity in the region totals about 2 million kilowatts, about two-thirds of which is in private ownership and one-third in local public ownership. An additional 3,100,000 kilowatts are under construction by the Federal Government and 115,000 kilowatts by non-Federal utilities. Thus, when all the projects now scheduled are completed, 6 or 7 years hence, the region will have more than 8,300,000 kilowatts of installed capacity.

Under the new power program of the Administration the Federal Government will undertake large multipurpose projects which are beyond the means of local public or private enterprise. Such a project is Libby Dam on the Kootenai River in northwestern Montana, endorsed by the Secretary of the Interior and the Secretary of the Army for immediate construction. One of the key upstream storage dams in the proposed control plan for the Columbia River, Libby would eventually add 880,000 kilowatts—including downstream benefits—to the Pacific Northwest power supply. This project offers complications because it backs up water into Canada and has international ramifications. There are other similar projects under consideration by State agencies and private organizations.

### *Partnership Necessary*

In order to meet the needs of the region for power, however, it is clear that substantial non-Federal construction is required. The construction job to be undertaken is too tremendous and costly for the Federal Government to carry the burden alone. Under the new power policy of the Administration local interests are being encouraged to play their proper part. This policy, keyed to the need for developing for tomorrow the Northwest's waterpower potential, is meeting with an affirmative response. Non-Federal utilities now have some 35 hydroelectric projects and additions to existing projects with a total of over 5 million kilowatts proposed for development in the Northwest. Many of these involve partnership development, with the private companies or local public agencies constructing the power facilities and the Federal Government financing the nonreimbursable features.

This positive approach, a departure from the negative view that only the Federal Government is equipped to do the job, recognizes that the cooperation of all groups is essential if the region is to be provided with the electric power it needs. The realism and effectiveness of this partnership program evolved by the Eisenhower Administration was recognized by the 83d Congress with the approval of legislation such as that authorizing public agencies in the State of

Washington to build the mammoth Priest Rapids dam with the Federal Government responsible for flood control and navigation facilities.

It is clear that local people are alert to the region's power needs and are aggressively working to solve the problem. It appears likely that much of the needed capital will be raised through cooperative effort and that several hydroelectric plants now under consideration will move forward and reach the construction stage in the next few years. Certainly the power problem offers a tremendous challenge to the region, and that challenge is being met.

### *Power in the Southeast*

In the Southeast, large volumes of water flow in abundance from the mountainous section of that area down to the Atlantic Ocean and the Gulf of Mexico. This water has a potential of nearly 13 million kilowatts annually which can best be used for peaking purposes when properly integrated with fuel burning systems. The firm and dependable energy from these projects, because of the irregularity of stream flow, is very much less than their capacity when used only a few hours a day for peaking purposes, and many of them have little if any dependable capacity if used on a 24-hour-a-day basis.

The Department's Southeastern Power Administration is responsible for the marketing of 1 million kilowatts of developed capacity produced at 7 projects located on 4 Southeastern rivers. Now under construction by the Corps of Engineers are four additional projects which will add another quarter of a million kilowatts of capacity.

### *Power in the Southwest*

In the Southwest, we are blessed with four great river systems: the Arkansas—fourth largest in the United States—the White, the Red, and the Gulf Coast river system.

A start has been made toward controlling the floods and developing the hydroelectric potential. Several large reservoirs have been constructed and planning is underway for others to generate hydroelectric power, regulate stream flow, provide a measure of protection to the areas downstream and provide storage for other priority uses, such as municipal and industrial water supply, pollution abatement, irrigation, and navigation.

In the Southwest, there are 10 existing major hydroelectric Federal and State projects with an installed capacity of 578,400 kilowatts, and an average annual generation of 1,925,100,000 kilowatt-hours. Two projects are under construction which will have an installed capacity of 175,000 kilowatts and an average annual generation of 616,000,000 kilowatt-hours.

### *Power Marketing in Southwest*

As the marketing agency of the Department of the Interior in the eastern half of this region, the Southwestern Power Administration is responsible for the sale at wholesale of such hydroelectric power.

The degree and timing of the development of projects to furnish a portion of the electric power and the domestic and industrial water supply which will be needed in the expanding development of resources in the Southwest will have a great bearing on the conservation and proper utilization of all the resources in the area.

### *Water Investigations*

As the Nation has continued to grow, its needs for water in every part have grown, sometimes in geometrical proportion to the population growth. Even in parts of the Nation outside the arid and semiarid regions, the problems of water supply have become far more pressing. It may be anticipated that in some areas in the future policies may need to be adopted to assure the best use of such water as is available.

It is the business of the Geological Survey to conduct the search for more and more water. Water circulates endlessly through the hydrologic cycle, but there are limits to its development for use by man. The Survey conducts the necessary investigations to determine the quantities of water available, its usefulness, and the extent to which it can be developed without depleting the supply or impairing the quality.

Demands in many areas have caused a substantial increase in the use of underground supplies. Investigations are being made by the Survey in order to determine the extent of this resource. With the basic facts thus provided, the Nation can assure proper development and use without harmful depletion.

In certain areas of the United States existing sources of water are inadequate. In some places the supplies of fresh ground water and surface water are limited. In other areas increasing pollution by reuse of the water is resulting in sufficient deterioration of water quality to prevent any use. Current investigations include the study of changes in the chemical and physical characteristics of water in order to forestall aggravated conditions. Studies of trends of the mineral content of western streams, for example, are necessary for continued operation of irrigation projects.

With development of the country, its smaller streams become increasingly important as sources of supply, but their reliability or suitability can be gauged only if there is adequate information on their flow patterns. The Geological Survey attempts to obtain such data.



### *Desalting Saline Waters*

In some areas where fresh water is extremely scarce a solution may be provided through development of a practical low-cost means of desalting sea water, or other saline water. The Department is now carrying on a research program aimed at producing water by this process which will be suitable for municipal, industrial, agricultural, and other uses.

Progress is being made. We are as yet a long way from any mass production process which would provide desalted water for industrial or agricultural uses on an economically feasible basis. It is possible, nevertheless, that domestic supplies of some coastal cities may be materially augmented by desalted sea water within the next few years.

If we succeed in achieving practical success in this program, we would have the promise of working a tremendous revolution for the betterment of mankind everywhere. When the millions of acres of parched land which could be made fertile by these methods are considered, the changes which could be wrought throughout the world defy the imagination. This program truly represents, therefore, one of the most important facets of the Department's efforts to develop new resources for tomorrow.

## MINERAL AND FUEL RESOURCES

Minerals and fossil fuels differ from some other natural resources in that once used they cannot be replaced. Many deposits not now known undoubtedly will be discovered, and ways undoubtedly will be found to utilize many already known but not now of commercial grade. Nevertheless, our total resources, as distinguished from our known reserves, are fixed in quantity. We cannot add to them, but can only subtract.

Despite their irreplaceable nature and their limited volume, minerals and fossil fuels are fundamental to our mechanical and industrial civilization. Indeed any civilization at all would be impossible without minerals, especially the metals. Man learned to fabricate implements and weapons of bronze—and, in the opinion of at least some authorities, of iron as well—before he learned to keep written records. If the supply of mineral raw materials and fossil fuels should be cut off, our whole industrial and economic machine would quickly grind to a halt. In fact the progress that has characterized the history of this country can continue only so long as these commodities continue to be available to us in constantly increasing volume.

In facing the challenge presented by the need for an ever-growing supply of mineral raw materials and fuels in the face of the inevitable depletion of our reserves, we can take heart from the experience of the past. When mineral deposits discovered in the early days of the Nation became exhausted, we found new ones. When it became clear that our forests would not provide enough charcoal to fuel our growing iron and steel industry, we turned first to anthracite and then to coke. When we ran short of whale oil and oil distilled from coal for illumination, we discovered that petroleum, formerly used chiefly as medicine, could light our lamps, and a great new industry was born. When an invention demanded better materials than were available at the time, we learned how to produce them. Conversely, when we learned to make new materials, we discovered hitherto unsuspected ways of using them.

Such developments throughout our history have followed a well-defined pattern. First scientists in their laboratories have advanced chemical or physical knowledge, sometimes intentionally but often apparently by accident. From their experiments, new substances have been developed as laboratory curiosities. Next, engineers have found ways of producing such substances economically and of incorporating them in designs. Finally, business enterprises have seized upon the results of such advances and translated them into end products.

Through the cooperation of scientist, engineer, and businessman we have developed new metals and fuels, sometimes from earlier wastes. For instance, in the early days of the oil industry gasoline was considered a dangerous waste material that had to be disposed of carefully by makers of kerosene; with the coming of the internal combustion engine this formerly discarded substance became one of the industry's most valuable products. We also have learned to utilize lower and lower grade ores; for example, most of the world's copper comes from material that would have been regarded as waste rock a few generations ago.

### *Formation of Cabinet Committee*

In meeting the problem of supplying our needs for minerals, the Department plays a major part. Twice during the past 15 years the United States has been drawn into international conflicts, and each time the supply situation with respect to strategic metals and minerals has been critical. Even in peacetime, rapidly mounting demands for mineral raw materials have continued to place growing pressure upon our resource base.

In view of these facts, the President on October 26, 1953, established a Cabinet Committee on Minerals Policy to study problems



relating to the production and utilization of metals and minerals and to make recommendations for national policies in this field. Membership on this Committee included the Secretaries of the Interior, State, and Commerce, and the Director of the Office of Defense Mobilization, with the Secretary of the Interior serving as Chairman. The Secretary of the Treasury and the Director of the Bureau of the Budget also participated in advisory capacities.

The Cabinet Committee during March 1954 presented an interim report containing a number of basic proposals. A key recommendation was for the establishment of a new, long-term stockpiling program. This plan, which was approved by the President and put in effect on March 26, 1954, calls for further acquisitions of 35 to 40 metals and minerals with the objective of virtually eliminating the risk that strategic and critical metals and minerals would become a bottleneck in time of emergency.

In appointing the Cabinet Committee, the President indicated that depressed conditions in numerous mining districts, largely the result of post-Korea adjustment, were of grave national concern. He asked that every effort be made to find an equitable solution to this problem, since strong and prosperous mineral industries form a primary component of a sound mobilization base. Consequently, the Committee indicated that purchases for the long-term stockpile were to be made, wherever possible, from domestic producers, and ordinarily at times when the Government decides that purchases will help to reactivate productive capacity and alleviate distressed conditions in industries producing strategic minerals and metals.

### *Normal Mineral Programs*

Stockpiling strategic and critical minerals and metals is, in effect, taking out an insurance policy against crippling shortages in times of national emergency. It is essential to the security, perhaps to the very life, of the Nation, but it is only part of the story of mineral conservation, which means wise use of our resources without unnecessary waste. To contribute to the solution of the problems involved in meeting our day-to-day requirements for minerals and fossil fuels, the Department conducts numerous programs. In cooperation with educational institutions, research foundations, and industry, it strives to encourage wise and careful use of known deposits, exploration for additional deposits, and the development of new and better materials.

Programs carried out through the Bureau of Mines to approach these objectives include: (1) Developing new and improved methods for processing known mineral resources to offset the declining grade of ore; (2) improving methods of extracting and treating minerals

and fossil fuels to recover valuable materials now wasted; (3) improving conservation of available materials now wasted; (4) improving conservation of available materials through reuse; (5) developing processes that will broaden the resource base to include more and more of the oceans, the atmosphere, and portions of the earth's crust not now considered economically usable; (6) providings new and abundant materials to meet or offset expanding requirements for older, scarcer commodities; (7) solving production and utilization problems that will make hitherto unused metals and minerals with peculiar properties available to meet the increasingly diversified requirements of the consuming industries; and (8) finding means of synthesizing mineral raw materials to meet and fill gaps in domestic supplies and to create better materials.

### *Material and Fuel Problems Interlocked*

Soaring demands for metals pose problems of both materials and fuels. Through the Bureau of Mines, for instance, the Department is seeking to develop feasible methods of utilizing low-grade bauxite and aluminum silicate rocks for the production of aluminum and of abundant ilmenite in place of scarcer rutile for the production of titanium metal. At the same time, because production of both aluminum and titanium, and of the third light metal, magnesium, requires tremendous amounts of electricity, soaring demands for them presents the problem of fuel.

Although about 20 percent of our electricity comes from hydro plants, the principal source for the immediate future will be installations burning coal, oil, or natural gas. Of these, our coal reserves are by far the greatest.

A Department research project, carried out by the Bureau of Mines in cooperation with a power company, culminated successfully last year with the opening of a generating plant burning dried lignite and designed ultimately to burn lignite char. The electricity will be used for aluminum production in Texas.

In making the char, tar also is produced. Since this tar differs from that obtained in carbonizing bituminous coal in coke ovens, studies are now being conducted to learn the nature and uses of the chemicals that can be produced from it.

This project already assures a future supply of low-cost electrical energy, and points to future development of a great but thus far little-used natural resource to yield not only fuel, but valuable co-products as well.

### *Steel and Coking Coal*

Assurance of enough steel for the future likewise presents both materials and fuel problems. On the materials side, the Bureau of Mines, enlisting the cooperation of industry, is conducting research on beneficiating low-grade and off-grade iron, chromium, and manganese ores, and on recovering manganese and iron from open-hearth steel furnace slags. The latter process is being tested by industry on a semiworks scale; its industrial utilization may one day supply half the Nation's annual manganese requirements.

On the fuels side, mindful that coke meeting rigid standards of strength and chemical composition is needed for blast-furnace use, studies are conducted on preparation of coals to remove impurities, blending of less desirable coals with better ones to make possible their metallurgical use, and reducing mining losses—now amounting to about 50 percent of the coal in the ground—without adding appreciably to costs.

The significance of such studies to the Nation's future is pointed up by realization that although our coal resources are tremendous, our reserves of high-grade coking coal are more limited and are being depleted rapidly.

### *Health and Safety in the Mines*

The Bureau of Mines has a continuing program of advancing health and safety in the mineral industries.

Improved teaching methods, new publications, detailed studies of hazards and their elimination, fostering of interest in accident-prevention campaigns, and compilation of pertinent statistics on accidents and their causes are chapters in the Bureau's program. These activities are increasing constantly with corresponding reductions in accidents and a growing interest by miners and supervisors in the crusade against fires, explosions, roof falls, transportation accidents, electrocutions, and other mishaps that still take a heavy toll of lives.

### *Saving Coal From Fire and Flood*

Currently idle coal deposits in many parts of the country lie in the path of fires, and encroachment of water threatens to cut short the life of the anthracite mining industry of Pennsylvania. Both threats are of concern to the Department.

Fire-control work carried out through the Bureau of Mines already has saved for coming generations more than 200 million tons of coal,



some in the West and some in the thickly populated East. Other millions of tons of coal of all ranks still lie in the path of fires, and measures are being developed by the Department to guard these irreplaceable reserves.

In eastern Pennsylvania, flood waters already have inundated millions of tons of anthracite, of which the Nation's reserves are extremely limited, and have hastened the closing of mines in this hard-pressed area. Through studies already completed and additional reports under preparation, the Department will be equipped to provide engineering assistance to comprehensive drainage and flood-control programs to save such reserves for tomorrow's needs.

### *Oil and Gas*

Since 1946 this Nation has discovered more than 1½ times as much petroleum and over twice as much natural gas as it has produced.

During 1953, the petroleum industry achieved the Government-established goal of capacity to produce, transport, refine, and distribute one million barrels a day in excess of current requirements. This reserve capacity, equalling about ⅓ of present consumption, assures the Nation of enough petroleum products to meet a sudden emergency.

Historically, the production methods used have recovered less than half the oil originally present in the ground. The Bureau of Mines is conducting studies aimed at increasing this proportion. As an example of progress, ultimate recovery from one pool is expected to be increased by 720 million barrels. Opportunities for similar contributions are almost unlimited and the Bureau is ever watchful for an opportunity to assist.

### *Oil Resources of the Continental Shelf*

The enactment of the Outer Continental Shelf Lands Act in 1953 paved the way for the development of oil, gas, and other mineral resources of the outer Continental Shelf. The Interior Department has been assigned the duty of supervising and regulating this development.

The outer Continental Shelf adjoining the United States, particularly in the Gulf of Mexico, represents one of the few remaining petroleum and mineral provinces that is largely unexplored. Although its development will require many years, a firm foundation has now been laid.

As a result of settlement of the offshore oil controversy through legislative action by the 83d Congress vigorously supported by the

Administration, offshore oil production is expected to increase greatly and bring substantial royalty payments to the Federal Treasury.

The discovery of oil under the water of the Continental Shelf and the development of methods of extracting it constitute a tremendous achievement of American science and enterprise. For years the development of this resource was hampered by litigation and political dispute. The action of Congress has now made it possible for development to proceed, in both State and Federal areas, thus adding a tremendous potential supply to the Nation's oil reserves.

### *Synthetic Fuels*

To postpone the day, predicted by some authorities, when the margin between our productive capacity and our rising requirements for petroleum will narrow, the Department cooperates with industry in both immediate and long-range research.

An important line of attacking the problem of meeting rising demands for liquid fuels is research upon their production synthetically not only from coal, but also from oil shale.

Our oil-shale resources have gone unused partly because of a feeling that mining costs would be prohibitive. The Bureau of Mines has developed and tested techniques and equipment that have shown these fears to be groundless. This accomplishment, coupled with the development and testing of retorting and refining methods, has brought down the cost of shale oil until it is approaching that of natural petroleum. It is anticipated that industry now will assume some of the research load in this field.

### *Exploration Programs*

The activities of the Defense Minerals Exploration Administration, designed to encourage exploration for strategic and critical minerals and metals, are an important aspect of the Department's efforts to aid in the development of new sources of minerals for the future.

Under the Defense Minerals Exploration Administration program the Government shares in the cost of the exploration. Specific projects for exploration are established by contract in which the Government participates to the extent of 50 or 75 percent of the cost, depending upon the mineral sought. The amount contributed by the Government is repayable as royalty from the net sales receipts for any ore produced.

From the beginning of the program in mid-1951 to June 30, 1954, 2,221 applications for Government aid in exploration have been received from 24 States and Alaska. During fiscal 1954 Defense Minerals Exploration Administration approved 130 contracts, bringing

the total number of contracts executed since the inception of the program to 647. Government commitments in contracts executed in the past 12 months amount to \$4,275,001, bringing the total to date to \$19,371,100. Industry participation in the past 12 months has been \$2,479,475, with a total to date of \$12,446,624.

Substantial quantities of minerals have been found. Current production is small, coming principally from ore removed during the exploration work, but as mining operations are expanded the ultimate production will be important to the national economy and defense.

In addition, during the search for higher grade ore, deposits of lower grade have been found which may be brought into production in the future. These constitute a reservoir of strategic minerals which is an important element in the Nation's preparations for the minerals problems of tomorrow.

### *Geologic Investigations*

The urgency of the search for new sources of essential minerals demands a continual improvement in the techniques of mineral exploration. In recent years, all of the physical sciences have been drawn upon, sometimes in dramatic fashion, in the endeavor to pierce as quickly and accurately as possible the geologic problems which hold the key to new mineral wealth.

The focal point of much of the Government's activities in this scientific research is the Geological Survey. The application of airborne magnetometer and radioactivity methods, and the modification for field use of various laboratory techniques in geochemical and geobotanical prospecting has been pioneered by the Survey and found wide favor in the mining industries.

Through its scientific facilities and vast accumulation of data the Survey will undoubtedly continue to make significant contributions in this field so important in the overall task of providing resources for tomorrow.

Only a small proportion of the Nation's total supply of the principal minerals is located on the public lands, but as a part of the overall minerals development program of the Nation it is essential to assure the proper supervision of development and producing operations on these Federal and Indian land mineral leases.

This activity, carried out by the Geological Survey, includes enforcement of the applicable operating regulations and lease terms, and the requirement of adoption of safety measures designed to protect the resources from underground loss or damage.

Liberalized leasing regulations have accelerated prospecting. Since 1945, for instance, sufficient reserves of potash have been discovered



to meet the anticipated national needs for this commodity for more than 150 years. Recent explorations have brought to light prospective sources of strategic minerals on national forest lands: Nickel and copper in Minnesota and Wisconsin; lead and zinc in Missouri; manganese in Arkansas, Tennessee, and Virginia.

The importance of assuring wise use or preservation of leasable minerals and oil and gas is illustrated dramatically by the importance of these products to this country's economy, protection, and physical welfare. During the fiscal year just closed, royalties accruing from leasing operations on federally owned and controlled lands amounted to nearly \$49,000,000.

### *Anticipating the Atomic Age*

As the atomic age advances, fissionable materials, particularly uranium and thorium, will be outstandingly important. Greater use of electronic equipment will enhance the importance and consumption of many of today's so-called rare metals such as germanium and selenium.

New alloys with superior physical, chemical, and electrical properties most certainly will be developed in the years ahead and will lead to increased demands for many of the uncommon metals, including the rare-earth metals.

To help assure that such demands will be met, the Bureau of Mines has been studying new techniques for beneficiating various types of uranium ores. It also has conducted metallurgical research on monazite sands—the principal sources of thorium and the rare earth metals—thus acquiring more knowledge of rare earth metals and compounds. The development of new and improved processes for recovering these elements from their ores is anticipated.

Impetus has been given to the production of uranium through the passage of legislation by the 83d Congress with full Administration support providing for the multiple use of our public lands. Formerly, production was handicapped by legal problems and complex leasing procedures. Since a very large part of our uranium supply comes from public land areas, this new legislation is of vital importance in accelerating the output of this critical material.

The new legislation will also aid in increasing production of other minerals and fuels. Some 60 million acres of public lands under lease for oil and gas production are now open for mineral development. Previously mineral development was excluded from the area. On the other hand, millions of acres of public lands on which mineral development will undoubtedly occur have also been opened to lease for oil and gas production.

### *Mineral Imports*

The United States, although by far the world's leading producer of mineral wealth, also depends wholly or in part upon imports for several essential minerals. The knowledge and background of the Department are used to keep the Nation abreast of developments in the mineral field abroad, and its professional skills and experience are on call to assist in the solution of technologic and economic problems of the mineral industries in friendly foreign countries, so that supplies of such minerals from foreign sources may be available to our industries when and as needed.

### PUBLIC LANDS

In the field of land management the Department has the primary responsibility with respect to an area (including Alaska) of more than 600 million acres. Of these lands by far the largest part (over 500 million acres) is administered by the Bureau of Land Management. BLM-administered lands consist for the most part of those lands, mainly in the West and in Alaska, remaining in Federal ownership today after many decades of settlement and acquisition of lands from the Government by our pioneers under the homesteading and other public land laws.

In addition to these lands, extensive areas embracing over 300 million acres of the public domain have been reserved for national forests, national parks, irrigation projects, military or atomic energy use, and other purposes.

Under the numerous public lands laws, over a billion acres of public land have been disposed of in the United States and Alaska since the founding of our Nation. There are nearly 500 million acres remaining in the public domain subject to possible disposal. Most of the latter lands are not now in demand, but population increases and shifts, technological improvements, and steadily improving economic conditions constantly create new demands.

The Department executes the land laws providing for disposal of such lands. Strenuous efforts have been made during the year to speed up the issuance of patents and the processing of other necessary governmental actions.

Lands for such purposes have also been made available through a policy of revoking unnecessary withdrawals. In past years much public land that clearly will never be needed for public purposes was withdrawn from private use. A continuous program is now underway to revoke such unnecessary reservations of public lands. Revocations in the United States and Alaska during the fiscal year

totalled close to 2 million acres and action on several million more acres is being considered.

Land resources in the United States are mainly developed and utilized by individuals. That is the situation whether the lands are privately owned or are in the public domain. With respect to federally owned lands Congress has through the years enacted a host of laws dealing with their use by the private segments of our economy. Under these laws it is a basic mission of the Department to integrate the public domain with the private economy so far as feasible, consistent with the continuing objective of the wisest and soundest use. The Department remains responsible for assuring sound resource management and development of such lands.

The Bureau of Land Management also works constantly with the land users to insure that sustained yield practices will be followed, in order to provide a resource base for future generations. A basic principle of conservation is to provide incentives to the land users to leave something for tomorrow. That is achieved through guaranteeing land users security of tenure on the lands they use.

As a result of such policies, individual land users not only cooperate with the Government in sound conservation practices, but commonly also take the initiative in making conservation improvements which build up productive values, far beyond the capacity of the Government to achieve alone. Other relatively inexpensive functions of the Bureau, such as cadastral surveys for the identification of boundaries, and land use planning and classification, help lay a sound basis for the most productive use.

The execution of these responsibilities has been given additional impetus by the recent reorganization of the Bureau of Land Management which provides for further decentralization of operations and the amalgamation of all the technical staffs into a technical bureau.

### *Forestry*

The forest lands administered by the Bureau of Land Management fall into three categories: (1) The revested O & C Railroad grant lands and other areas generally identified as O & C lands; (2) public domain forest lands in the continental United States, and (3) the public domain forest land in the Territory of Alaska.

These forest lands, which approximate 2½ million acres in the O & C area, 4½ million acres on the United States public domain and 40 million acres in Alaska, contain a basic resource having an actual value of billions of dollars. When such a resource is made available to private enterprise each dollar's worth of raw material permits the gainful employment of labor to create and fashion new goods and



structures which add immeasurably to the wealth of the Nation. It is the goal of the Bureau to enhance and perpetuate this wealth by proper management. Timber, being a renewable resource, can be so managed.

Forest management on the O & C lands, practiced under the sustained yield act of 1937, is steadily increasing the value of an already valuable resource. The act carries out the principle of good management by limiting the harvest to a rate that does not exceed the sustained yield capacity, thus insuring a continuous annual timber supply.

The public domain forest resource in the United States is scattered over 11 western and 11 eastern states from the Atlantic to the Pacific. The principles of forest management applicable to O & C lands also apply to public domain. To perpetuate the forest resource on this scattered area, the major problem, after providing adequate protection, is to overcome the fragmented pattern of ownership. Wherever feasible the practice of private tree farming is facilitated and extended either by integrating the management of public domain forest with such enterprises, or by sale of isolated tracts of public domain forest lands.

Controlled cutting, intelligently planned access roads, increasingly better protection, constantly improving forest practices, and more and more reforestation, are reflecting the effects of proper management on Bureau of Land Management forest lands. These activities serve to increase the harvest of salvage and overmature timber, and turn more acres over to the immature growing stock that will supply future generations with wood products, insure recreation values, and protect water supplies.

### *Cadastral Surveys*

Prudent management in any field of activity requires knowledge of the limits to which that activity can be applied. Cadastral surveys provide this knowledge in land matters by creating and establishing the boundaries of the public lands, identifying the subdivisions of those lands, and affording descriptions and areas for management and title purposes. Those surveys differ from purely informational surveys conducted by other agencies in that the land boundaries are actually established and marked on the ground by substantial monuments. An equally important part of the cadastral program is the reestablishment of survey lines and corners which have become obliterated due to passage of time and destructive forces of the elements.

Of vast importance to the nation and to the industry has been the establishment of suitable leasing units, by cadastral processes, on the outer continental shelf in the Gulf of Mexico. This affords a basis for the leasing of those areas and the development of the tremendous mineral potential beneath the waters of the Gulf.

In carrying out this cadastral program, attention is given to the long range needs for establishing land boundaries for the future development and conservation of our resources.

### *Classification, Use, and Disposal of Public Lands*

Land classification is a tool whereby lands may be put to their highest use. Land classification is also a means whereby the land ownership pattern may be simplified for more efficient management.

It should be noted, however, that land classification has never been applied in Alaska since in a large, undeveloped area such as this Territory it is generally more feasible to permit development to proceed along the lines that seem most appropriate to the individual settler.

The principles observed in the classification, use and disposal of public lands are:

- (1) Place in private ownership those public lands which are adaptable to agricultural production.
- (2) Place in private ownership those public lands which are isolated from other public lands and not subject to efficient public management.
- (3) Retain in public ownership for sustained-yield management those lands which are not suitable for private ownership under present conditions. These lands consist of sustained-yield forest units, grazing lands not susceptible to individual ownership, and other lands which are needed for public use.
- (4) Place in State or local ownership those lands which are used and can be efficiently managed in the public interest by local governing bodies.

Because of the selective manner in which the public domain was disposed of under the public land laws, the remaining public domain in many areas presents a problem of land ownership pattern. An intermittent and intermingled land ownership pattern is a deterrent to proper land use and conservation practices. It is the responsibility of the Bureau to so manage public domain that the land ownership pattern is simplified. This will contribute to better use of both public and private lands.

Simplification of the land ownership pattern is presently being accomplished by land sales, private land exchanges, exchanges of

lands with the States, restoration of public lands from restrictive withdrawals, and selective disposals under various public land laws.

The Bureau's lands program is pointed toward consolidation of lands producing timber and forage so that they may make maximum contributions to the local and national economy.

### *Range Management*

Continued progress in the management, conservation, and improvement of the public land grazing resource has reversed the trend of range deterioration in past years. Adjustments in grazing use to the sustained productivity of the forage resource and gradual improvement of the soil through conservation practices will help assure an adequate forage supply to serve tomorrow's needs.

The range administration activities of the Bureau are directed toward the full utilization of the Federal range forage resources in the future and continued stabilization of the livestock industry dependent upon them.

Present day technology applied to range conservation practices is demonstrating the full potential of increased productivity. The success of the Bureau's range waterspreading practices has attracted international attention as an effective soil and water conservation measure. Great strides have been made in the field of artificial range revegetation, although millions of acres of public rangeland still remain in need of treatment to attain maximum productive capacity.

Both immediate and long time programming of the Bureau's conservation activities is based on a watershed approach in order to fully utilize the available physical data obtained from river basin and similar studies. Recently this programming has also been geared to the Department's twenty-year plan of conservation for all Interior lands. Long time plans also provide for needed range improvements such as stockwater, fencing, truck trails and similar measures to facilitate use of the range. While many such improvements have been installed, much remains to be done. The accomplishments here as in range administration and conservation all provide positive evidence of proper resource management for the future.

## INDIAN RESOURCES

Lands held in trust by the Federal Government for Indian tribal groups and individual Indians, comprising more than 54,000,000 acres, are a factor of major importance in the future resource picture of the Nation and particularly of the West.



It is the purpose of the Department to terminate Federal supervision as rapidly as the Indians are ready and willing to assume the full responsibilities of citizenship and where the States and local governments are prepared to render them normal community services. As this process takes place, the Indians will assume themselves the management of the resources of their lands. The Federal programs directed to conservation of these lands and resources, therefore, must look to that day.

Although some parts of the Indian estate are sharply limited in economic value and a few areas are virtually worthless, the combined area still looms large in significance. It includes, for example, about 850,000 acres of irrigated land which in 1953 produced crops valued at more than \$40,000,000. Nearly a third of the area, about 16,000,000 acres, is forest land with an estimated volume of 41 billion board feet of timber. Roughly 30 billion board feet of this total is on 6 million acres classed as commercial forest.

Also included in the total are more than 44 million acres of rangeland with an annual grazing capacity for 880,000 cow units and an annual use value of \$6,500,000.

Underlying the Indian lands are deposits of oil, gas, uranium, and other minerals which, in the year ended June 30, 1954, produced an income for Indians of over \$30,000,000. Many of the Indian lands, located in key watershed areas, are vitally important from the standpoint of streamflow and reservoir protection.

The future of these Indian resources must be considered from two points of view. On the one hand there is the prospect that increasing portions of the Indian estate will move out of trust status and into unrestricted private ownership as additional Indians and Indian groups reach the level of competence where they are able to manage their assets without further Federal supervision. On the other side is the job which remains to be done in developing, managing, and conserving Indian resources prior to the eventual termination of trusteeship.

### *New Legislation*

The 83d Congress undoubtedly achieved more progress in providing Indians with full authority and responsibility for handling their own economic affairs than any previous Congress in the Nation's history. During the first session it adopted, in House Concurrent Resolution No. 108, a basic policy that Indian tribal groups should be given such authority and responsibility as rapidly as feasible. In the second session it held hearings on a substantial number of bills designed to accomplish this purpose for particular Indian groups, enacted one

into law during the fiscal year 1954, and had several others under active consideration at the end of the fiscal year. Involved in these measures were two of the most important Indian timber holdings in the country—those of the Menominee Tribe in Wisconsin and the Klamath Tribe of Oregon.

What the ownership pattern of Indian lands will be after termination of Federal trusteeship is impossible to predict since the decision will be made by the Indian owners and not by the Federal Government. As an illustration, legislation for the Klamath Tribe, developed in accordance with recommendations of the tribal leaders, specifically provides for dividing the tribal holdings into two major segments. One of these would be sold and the proceeds distributed to those members wishing to withdraw their individual shares of the tribal assets. The other would be held in tribal ownership and managed for the benefit of individuals choosing to remain in the tribal organization.

Other termination bills considered by the 83d Congress provide the Indians affected with an option of disposing of their property or continuing to manage it either through a private trustee or as an organized group.

Pending the eventual termination of Federal trusteeship, the Bureau of Indian Affairs has a continuing responsibility to safeguard the Indian trust lands and to promote their effective development and use to the fullest possible extent. This involves principally conservation of the soil and water resources, proper development of the mineral assets, sound management of Indian forests and ranges, and assistance to Indian farm families in agricultural and home-making techniques.

### *Soil and Moisture Conservation*

The soil and moisture conservation program of the Bureau is in the process of rehabilitating the 55 percent of Indian lands with severe and critical erosion and of saving from destruction the 45 percent where erosion is slight to moderate.

The application of conservation and improved land treatment measures, combined with healing natural processes, frequently develops the soil to a higher state of productivity than that found under virgin conditions.

The Department's 20-year plan for soil and moisture conservation as developed by the Bureau for Indian lands is aimed at stepping up production to keep pace with the population increase. On irrigated lands production will be greatly enlarged by the better usage of water resulting from leveling, revision of distribution systems, the control of salts and improvements in method of application which better control the amount of moisture available for plant growth.

On dry farmland similar results will be achieved by the installation of upland waterways, terraces, and contour farming; the production of cover crops, including legumes, in rotations to increase soil nitrogen and organic material; improvements in tillage practices including rough tillage and subsurface tillage; the introduction of new crop species, weed control, and the application of fertilizers as part of the farm conservation plan.

On rangelands the work will emphasize brush removal, reseeding, and water spreading to increase the yield palatable of forage and development of ponds such as the improved deep-pit charco, as a means of obtaining better distribution of stock and making more effective use of the forage.

Soil and moisture conservation is also an extremely valuable part of the termination program in Indian affairs. It prepares the individual for high-caliber citizenship. The Indian plans with technicians the future of his operations and his land. He puts the plans into effect and year by year improves his property and its productive capacity. In the process he becomes economically independent.

### *Mineral Resources*

The widespread exploratory interest on numerous Indian reservations and the extensive leasing of lands for development of oil and gas and strategic minerals indicate that these lands will contribute materially to the future needs of the Nation. Income to the Indians from oil and gas and other mineral development has been increasing steadily for the past several years and in fiscal 1954 reached a peak of more than \$30,000,000.

In contrast with earlier years when mineral development on Indian lands was largely confined to Oklahoma, many tribes in other parts of the country are now benefiting from exploration operations.

The orderly development of oil and gas and other minerals is the program for the period ahead. This will be accomplished by unity of purpose and action in which the Indian landowners and the industry take the leading part. The program is implemented by oil and gas unit and communitization agreements and cooperation with the State agencies. Such a program will serve to prolong the life of the oil and gas fields, meet future petroleum needs, and increase the income of the Indian landowners. This program had its start on Indian lands in Oklahoma in the 1920's and has resulted in prolonging the life of the fields and materially assisting in meeting the demand for petroleum.

As far as strategic minerals are concerned, recent developments on reservations in New Mexico, Arizona, and Utah, warrant an optimistic outlook.



### *Timber Resources*

The management of Indian forest lands contemplates their conservative development and use, by the Indian people, for the purpose of promoting self-sustaining communities. It is concerned, in other words, with human as well as forest resources. The ultimate objective of the Indian Bureau's forest management program is to help those tribes with timber resources to reach the point where the present Federal trusteeship may be terminated and the estate turned over to the Indian owners.

Although much remains to be done, there has been notable progress in the management and conservative use of Indian forests under Government supervision. The present annual timber harvest from the 6 million acres of commercially valuable Indian forest is about 575 million board-feet. The annual income to the Indian owners, in the form of stumpage payments, amounts to more than \$9,000,000.

Because of fund limitations, it has not been possible to develop the forests on all Indian reservations to their full productive capacity. To accomplish this will require reliable data regarding present volumes and growth potentials, and access roads to facilitate the harvest of overmature and decadent timber.

In the past 2 years the Indians of several reservations have made their own funds available to obtain forest inventories and to prepare management plans. While progress in access-road construction has been less encouraging up to now, the prospects for the immediate future seem to be somewhat brighter.

It is believed that, with full development, the present Indian forests are capable of producing about 700 million board-feet of commercial timber annually.

### *Extension Work*

Through its extension program the Bureau of Indian Affairs has been making another contribution to the conservation and development of the Nation's resources by educating the Indian citizens to the value of their agricultural resources and the proper use of them.

This is being accomplished by gathering scientific and practical information relative to these resources and passing it on to the Indians in a form which they can understand and use beneficially. Meetings, short courses, observational tours, and field demonstrations are conducted at which Indians are advised concerning the proper development and use of their agricultural resources. This enables them to realize the greatest possible returns from their resources and, at the same time permits passing them on to future generations in a highly productive state.



## FISH AND WILDLIFE

The Department's Fish and Wildlife Service, guardian of our Nation's free-moving creatures of the sea, air, land, and fresh-water areas, has set its sights on the year 1975 as a major check-point in its look to the future.

By that year, the available supplies of food fish must have increased by 25 percent in order that the nutritional needs of our anticipated human population may be met.

By that year, too, about 4 million American waterfowl hunters—nearly twice the present number—will be gunning for wild ducks and geese, expecting to find enough birds available to satisfy a reasonable sporting urge.

These demands, along with many others having no time limit, guide the Fish and Wildlife Service in planning and carrying out its programs.

### *Commercial Fishing*

Although the combined commercial fisheries of the United States and Alaska yielded 4.4 billion pounds of fish and shellfish (valued at 345 million dollars) in calendar year 1953, this catch was considerably below the potential. Since fish and shellfish are particularly valuable sources of protein, utilization of food from the sea will have special importance in meeting the nutritional needs of the Nation's future population.

The production of haddock in the north Atlantic could be increased 50 percent by scientific adjustment of the fishing rate. There are great underfished resources of herring in the north Atlantic and west Pacific, of pilchard in the south Atlantic and south Pacific, of tunas in the central Pacific and south Atlantic, of cod in the north Pacific and the Atlantic. These latent stocks of fish constitute resources for the future, which present research and other activities of the Department are helping to conserve and make available.

Increasing the production of fish will not ensure improvement in the Nation's diet, however, unless these valuable food items are added to the menu. Already, steps are being taken by the Department to work toward this objective.

Probably the most important piece of legislation enacted in many years for the benefit of the Nation's commercial fisheries is the Saltonstall-Kennedy Bill approved by the 83d Congress. This bill earmarks \$3,000,000, for a period of 3 years, from duties collected under the custom laws on fishery products, for transfer by the Secretary of Agriculture to the Secretary of the Interior. These funds are to be used in promoting the free flow of domestically produced

fishery products in commerce by means of an educational service, along with technological, biological, and related research programs.

The average (per person) consumption of fish has hardly changed in the last 25 years. This new program, to promote understanding of the value of fish for food, should make a valuable contribution toward meeting the Nation's nutritional needs in the future.

In Alaska, because commercial fishing is the chief source of income, the Service keeps a watchful eye on aquatic resources. Conservation measures are applied constantly as a safeguard against overfishing. The salmon industry, which accounts for 90 percent of Alaska's fishery products (from the standpoint of value), has been fully exploited for a number of years. As a result, the Service recently found it necessary to protect the salmon by means of strict regulatory controls on the take of this species.

Through such measures future generations of Alaskans will be able to find a livelihood, as their fathers have done, in the north country's fishing bays, inlets, tidal basins, and open coastal waters.

Considerable effort has been made by the Service in recent years to expand the Territory's latent fisheries, with activities in this direction centering around the yield of king crabs and groundfish. The king-crab fishery has shown gains, and bottom fish are expected to form the basis of a recognized fishery in the near future.

The staff members of the Service's Pacific Oceanic Fishery Investigations is searching the seas around Hawaii and westward through the Trust Territory of the Pacific Islands for new sources of protein for the American dinner table.

Valuable information on the distribution of Pacific tuna is being obtained, along with facts on the abundance of this highly important food species. Similar studies are being made by the Service in Atlantic and Gulf of Mexico waters, with various species of fish and shellfish under scrutiny. New fishing grounds are being opened up, and improved methods of catching fish are being developed.

Trouble-shooting in connection with the Nation's commercial fisheries has been a necessity from the earliest days. Through biological research, the Service has suggested solutions which in some cases have alleviated such adverse situations as a sharp decline in the catch of haddock in the late 1920's; the recent invasion of Lakes Huron, Michigan, and Superior by the fish-killing predator known as the sea lamprey; and the mass mortalities of fish resulting from a plague called the "red tide" which has periodically infested the waters off the west coast of Florida.

### *International Cooperation*

The past few years have brought increasing cognizance of the international aspects of fish resources, with the Service playing a prominent role. The need for cooperation among nations has become more apparent with each passing year, and the result has been a rise in the number of international fish-conservation agreements, as well as more active exchange of technological information and skills.

International teamwork recently resulted in substantial economic gain for the trawler fishermen of New England. On the recommendation of the International Commission for the North Atlantic Fisheries, the United States promulgated a new regulation designed to conserve undersized haddock. The small fish thereby spared for future seasons will be worth a million dollars each year, according to Service calculations.

### *Sport Fishing*

In the interest of good sport fishing the Service is keeping constant vigilance over the Nation's game fish, concentrating particularly on reserve stocks and potentials for the anglers of the future. Service sport-fishery specialists have found that only through wise and careful management of our game-fish resources can stocks be expected to hold out under the heavy fishing pressures extant today and even greater pressures expected to develop in the years to come.

Fortunately, fresh-water fishery management is coming into its own as a science. With the aid of research, the Service is learning how to make better use of hatchery-propagated fish and how to rear better fish more economically. A good understanding of fresh-water fish populations, their environments, and their proper utilization is gradually being acquired and new techniques of fishery manipulation are being developed. By means of this fresh knowledge, stocks are both preserved and expanded.

Designed to restore and protect game fish for the future, the Dingell-Johnson program is a joint Federal-State endeavor administered by the Service. By means of this program, State sport fisheries are reaping the benefit of constant research and development activities. Land and water areas are being purchased to increase public fishing opportunities, and physical improvement projects in the fisheries are resulting in greater game-fish productivity as well as the creation of new fishing waters.



### *Migratory Waterfowl*

Because of their migratory habits, American waterfowl are peculiarly the concern of the Federal Government. Seasonal flights carry some of our wild ducks and geese from the Arctic Ocean to the northern regions of South America and back again. Crossing international boundaries in spring and fall, these intercontinental migrations gave rise in 1916 to the Migratory Bird Treaty, whereby the United States and Canada agreed to give migratory birds the fullest possible protection against undue depletion. In 1936, a similar agreement was reached with Mexico.

To assure perpetuation of wild ducks and geese for the hordes of waterfowl hunters that take to the marshes each fall and winter, the Service works on a year-round basis studying and protecting these much-sought-after game birds. Breeding-ground, wintering-ground, and hunting-success surveys are conducted annually, and the result is a close check from one end of the year to the other on waterfowl survival trends.

The National Wildlife Refuge Program of the Service is a great general insurance program for the benefit of these birds. In many of the Nation's most heavily shot areas there are Federal refuges to harbor waterfowl when hunting pressures get too severe.

This refuge program has recently doubled the number of Canada geese in areas where waterfowl hunters do their shooting. During the next 10 to 15 years, if the program is carried forward to its goal, the number of geese in these areas will be tripled. A great deal of pressure has already been taken off the heavily hunted ducks.

Other birds receiving special attention at Federal refuges are the rare trumpeter swans and whooping cranes. Through careful study of these unique native species, and through scientific measures designed to increase their chances of survival, the Service is playing a leading role in saving them from extinction.

### *Alaska's Fur-Seal Herd*

The successful handling of Alaska's fur-seal herd by the Federal Government has been cited by naturalists as an outstanding example of proper conservation and channeling of an animal population in the natural state.

Since the Government first assumed direct responsibility for this resource, 45 years ago, the herd's ranks have swollen from 125,000 to 1,500,000 seals. During this period more than 1,800,000 skins have been taken from male fur seals with no detriment to the herd, since these males were surplus to the breeding requirements of this highly



polygamous species. The herd has now reached a peak of development, and a sustained annual yield of 60,000 to 70,000 skins is being maintained.

To preserve other wildlife for future generations, the Service administers the Pittman-Robertson program whereby game species are restored and protected through a variety of life-giving projects. These projects, initiated and conducted by the States, consist principally of research, surveys, land acquisition, and land development. Recent projects have given new impetus to the perpetuation of antelopes, elk, wild goats and sheep, deer, caribou, moose, bears, wild turkeys, quail, pheasants, grouse, and doves, to name but a few.

### *Control of Predatory Animals*

The control of predatory animals such as coyotes, wolves, bobcats, and mountain lions is often a decisive factor in successfully stocking an area with desirable species. It is also a necessary management tool in building up game populations in localities where the ranks have been seriously depleted through overhunting or other causes.

Predator-control operations are carried out by the Service in many areas of the United States and Alaska. Although the Service's predator-control operations in the West are conducted primarily to reduce livestock losses, these operations are benefiting game species indirectly. As a result, profitable livestock production and continued hunting opportunities are being assured under one and the same program.

The Service has been called upon recently to participate in a number of multiple-purpose resource developments. As a result, it has been necessary to stress the importance of preserving fish and wildlife in the face of irrigation, flood control, electric power, and river-navigation projects.

When necessary and feasible, the Service is recommending the acquisition, in advance, of compensatory lands to replace wildlife habitat that would be lost as the result of reservoir construction. Lands at several Federal reservoirs were made available during fiscal year 1954 for management of wildlife and fishery resources by State and Federal conservation agencies.

The Service is forcefully pursuing its policy of protecting fish and wildlife in connection with all water-development projects. Uppermost in mind is the fact that these resources are important not only economically, but sociologically as well. The role these resources play in satisfying the growing need among the American people for outdoor recreation cannot be measured in dollars and cents.

### *Research for the Future*

Recognizing the need for facts on which to base effective wildlife management, the Service is cooperating extensively with colleges and universities throughout the Nation in research and training activities. Research laboratories have been established, and biologists have been assigned to attack the problem of wildlife diseases and similar perplexing questions. Service researchers are playing a prominent part in the recognition of fish and wildlife surpluses, and in pointing out the advisability of harvesting these surpluses within sound biological limits.

Through these and many other research activities, the Service is laying the foundation for efficient planning, reasonable approaches, and enlightened action. As a result, longer-range conservation and better use of our fish and wildlife resources may be expected in the future.

### NATIONAL PARKS

One of the most striking and significant social phenomena of mid-century America has been the tremendous surge of public interest in our national parks. If present trends continue, moreover, this interest is expected to grow at an even more spectacular pace in the future.

In 1910 only about 200,000 visitors were counted at all of our national parks. By 1920 this had increased to 1,000,000, in 1930 to 3,000,000, and in 1940 to 17,000,000. Following World War II, this upward trend was greatly accelerated. By 1950 more than 33,000,000 people were enjoying our parks each year and by 1953 the total had reached the record height of more than 46,000,000.

This continuing increase in the number of people finding recreation and enjoyment in our national parks is clearly the result of a variety of factors which are having an ever greater impact on our national way of life.

One of these factors has been the automobile. In recent years the automobile and the expanding network of good roads has made travel to once remote areas possible for millions of Americans. At the same time, our civilization has provided our citizens with increased amounts of leisure time to devote to personal interests, such as travel.

Other factors which have combined to focus attention on our national parks are the continued growth of population and the progressive urbanization of the Nation. Our cities are spreading over the landscape. As they grow closer and closer together, the once great vistas of open land and endless forests are being steadily reduced.

These developments have limited the areas in which we can enjoy the timeless beauties of nature at the same time that other tendencies have created a growing need and opportunity for such enjoyment.

It is clear, therefore, that as our Nation continues to grow, we will undoubtedly treasure with increased concern the areas of unparalleled scenic beauty and historic significance which have been set aside as national parks to be preserved for the enjoyment of all.

The Department is determined to meet its responsibility to care for and broaden these opportunities for enjoyment. As the need dictates and the opportunity arises, additional areas will be added to our national park system and existing areas further developed and expanded.

In keeping with this overall objective, the Department also will continue to work with local governments for the development of State parks, and will seek to utilize the full recreational potentialities of other areas, such as storage reservoirs and the lands around them.

## DEVELOPING ALASKA'S VAST RESOURCES

In spite of all the wealth that has been produced in Alaska from fisheries, mines, furs, and forests, the real significance to the United States of this giant of the Territories lies in its development potentials. Alaska represents a vast storehouse of resources for the future because it is beyond question the largest and richest undeveloped area of the Nation.

The problems peculiar to Alaska, including commercial fisheries, land management, industrial and defense development, are being attacked by the Department on all fronts in an attempt to foster accelerated development of the Territory.

These activities include emphasis on the policy of freeing the lands of the Territory from unnecessary withdrawals to permit more land to pass into non-Federal ownership, thus hastening the development of these resources for tomorrow.

Alaska salmon operators and fishermen joined with the Department during the fiscal year in unprecedented conservation measures designed to aid in restoring the pink salmon runs in Territorial waters. These measures are an important part of the effort looking forward to a rich resource future for Alaska.

Another phase of the Department's activities in the Territory has been the successful attempt to improve the efficiency of its operations affecting the Territory, thus providing better public services as well as savings for the taxpayer. Illustrative of this effort was reorganization of the Alaska Railroad which has resulted in the replacement of a loss in fiscal 1953 by a \$766,000 profit in fiscal 1954.

The future of Alaska is of international as well as national significance. It is not only an air crossroads of the world and a fortress of American defense; it is also part of an essentially single region of North America which includes northern British Columbia and the



Yukon territory in Canada. These related areas in the Dominion are equally undeveloped and equally important on a continental scale to the economics of the future. The international boundary between the Canadian and United States portions of this northland region is a completely artificial one. There is no geographic separation established by the physical features of mountains, valleys, lakes, and rivers. The full potential of this region, Canada's Northwest as well as Alaska, can hardly be realized until the two nations find a way to join hands in the utilization of its natural wealth.

### *Tremendous Hydro Potential*

Water resources furnish the most dramatic example of this political economy relationship. On the Canadian side of the boundary that separates British Columbia and Yukon territory from Southeastern Alaska are enormous supplies of water, most of which flows northward to enter the Yukon River system or westward through gaps in the coastal Rockies to the sea. On the United States side the mountains slope precipitously to the Pacific Ocean, furnishing a huge power potential if Canadian water can be brought through the mountains to take advantage of the abrupt drop in altitude.

Competent engineers have appraised this power potential as among the greatest in North America, with estimated costs at phenomenally low levels. Further south at Kitimat in British Columbia the Canadians have proved the size and cheapness of a similar power supply in an area where Canada controls both the water and its outlet to the ocean. An aluminum empire, based on cheap power and including a new city, is being built in this portion of the Canadian wilderness, thus providing a large-scale demonstration of the practicability of this kind of enterprise.

On an international basis, the same kind of development is possible in the Alaska-Canadian areas north of Kitimat, but it will require new principles and new techniques of cooperation between the two nations to accomplish it.

### *Alaska's Forest Resources*

Alaska not only has many other waterpower possibilities in stream valleys which it wholly controls, but many other resources of importance to the economic welfare of the United States. Among the most important of these are Alaska's forests, which cover the coastal slopes of the mountains from Ketchikan to the Kenai Peninsula. Here is one of the last great virgin forests of the world, so protected by humidity and rainfall that fire damage has never been a serious problem.



While there has been some use of Alaskan timber on a small scale for many years, the recent opening of a multi-million-dollar pulp mill near Ketchikan represents the first large-scale use of this forest resource. Since the coastal forest cover stretches far to the north in the Tongass and Chugach national forests, there are many opportunities for other industrial plants of a similar character.

### *Petroleum Possibilities*

The petroleum possibilities of the far north are so great that oil companies have been busy in many parts of Alaska exploring and leasing oil lands, while in some areas drilling operations are under way. Navy exploration has already demonstrated the existence of oil and gas resources north of the Brooks Range. Other prominent structures now being actively explored are in the Yakutaga-Katalla area near Cordova, in an area near Chinitna Bay, at the base of the Alaska Peninsula, and in a region east of Palmer. Geological investigations are also under way in other parts of Alaska.

In these explorations the Department of the Interior has a heavy responsibility in the issuance of leases and in providing map services, geological data, and supervision over the oil development, and a transportation responsibility arising from its operation of The Alaska Railroad and the Alaska Road Commission.

### *Mineral Resources in Alaska*

Although many millions of dollars have been taken from Alaska's wealth in gold, copper, coal, and other minerals, the full extent of Alaska's mineral resources is not yet known. The areas of exploration and possible exploration are so vast it is not improbable that additional discoveries will be made for many years to come. The absence of adequate transportation, except air transportation, now makes it necessary to concentrate on very high grade, high value deposits.

For the development of Alaska's resources of the future a great deal depends on the work of the Department's Geological Survey and Bureau of Mines. The work of territorial agencies centered at Juneau and at the University of Alaska, at Fairbanks, is also making its contribution. Above all, land problems emphasize the partnership relation between the Department of the Interior and local enterprise in both the use and conservation of the Territory's resources.

There are many other Alaskan resources, the future use of which depends upon a partnership relation between business and government. The handling of fishery resources is one of these. Except as the Department of the Interior, Alaska's fishermen, and Alaska's

salmon canning interests can find effective and rational ways to conserve fishery resources in the present, the significance of fisheries as a resource for the future may continue to decline.

The problems of conservation of resources involve use as well as conservation. A mature forest deteriorates when the crop is not harvested. On the other hand mining operations limited only to the extraction of the highest grade ores make more difficult the profitable mining of lower grade deposits which may be greatly needed by future generations.

Many governmental agencies in addition to the Department of the Interior are involved in the conservation and resource use problems of the territories: the Department of Agriculture in its assistance to farmers in the Matanuska and Tanana valleys and on the Kenai Peninsula; the Department of Commerce in its aid to the development of territorial aviation; the Department of the Treasury through the activities of the Coast Guard, and others.

### *Other Territories*

In territorial areas of the United States other than Alaska the use of existing resources is of far more importance to future economic progress than is the expectation of finding previously unexplored sources of wealth. This would seem to be true of the Commonwealth of Puerto Rico and the Territory of Hawaii. In such areas conservation is necessarily of overriding importance.

In any consideration of the utilization of physical resources it must never be forgotten that human resources are paramount, for it is only in their effect upon human welfare that the use and conservation of physical resources have any meaning.

In all territorial areas political developments go hand in hand with economic growth. A free people are the most productive and the development of both the form and substance of self-government is not unrelated to the wise use and conservation of resources. In this field the Department through its Office of Territories will continue its historic mission of assisting territorial peoples in establishing the conditions which make representative government possible, and of providing ever-increasing opportunities for them to participate in that government.

### CONCLUSION

Gifford Pinchot, one of the greatest conservation leaders of this country, summed up the essence of sound resource planning when he said “. . . conservation is the farsighted utilization, preservation, and

renewal of forests, lands, and minerals, for the greatest good for the greatest number for the longest time.”

This time-tested doctrine has provided a guiding philosophy for the Interior Department's many resource activities. We think, as this report has indicated, that a good job is being done. It could, of course, be better. There is a constant need for reexamination of our resource programs to insure that necessary reorientations and changes are made as required.

In the past year, significant progress has been made by the Department in providing better public service at the same time that savings were achieved for the taxpayer. This resulted from a series of comprehensive administrative actions which were launched shortly after the new administration assumed office. Early in 1953, survey teams were appointed and asked to make a detailed review of the organization and operating procedures of each of the Department's bureaus and offices in order to develop the most efficient means of accomplishing the Department's programs. These teams included top level management personnel from industry and expert professional consultants as well as selected personnel from within the Government but outside of the bureau being studied. At the conclusion of these surveys, the teams made recommendations for organizational and operating changes to increase efficiency. These changes have been approved and at the end of the fiscal year most of the necessary bureau reorganizations have been completed.

As a result, it has been possible to reduce the Department's personnel costs by an estimated \$15,000,000, while improving services to the public. This saving was brought about in the main by increased efficiency. In previous years, the Department's employment had been substantially increased in anticipation of budget allocations which Congress did not enact. The personnel reduction which was achieved in the fiscal 1954 was, therefore, in conformance with the actual workload being carried by the Department and did not constitute a curtailment of operations.

These efforts to increase administrative efficiency, as well as allied activities in a variety of fields to assure the soundest possible programs for fulfilling the Department's responsibilities, will be vigorously pursued.

We shall continue to work as earnestly and as creatively as we know how to insure that the resource needs of tomorrow as well as those of today are met fully and efficiently.





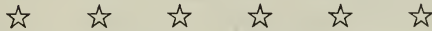
*PART II*

ANNUAL REPORTS OF THE  
BUREAUS AND OFFICES OF THE  
DEPARTMENT OF THE INTERIOR



# Office of the Assistant Secretary Water and Power Development

Fred G. Aandahl, *Assistant Secretary*



THE Assistant Secretary—Water and Power Development—is responsible for the supervision and direction of the water and power agencies of the Department. These are the Bureau of Reclamation, Bonneville Power Administration, Southeastern Power Administration, and the Southwestern Power Administration. The latter three agencies are solely marketing agencies for the sale of surplus electric power generated at Federal dams in their respective areas. The Bureau of Reclamation undertakes the construction of projects whose primary purpose is the reclamation of arid and semi-arid lands in the western part of the United States and also markets power in this area outside the boundaries of the Bonneville Power Administration and Southwestern Power Administration. The activities of these agencies are more fully described in sections of this report covering each of the Department's bureaus and offices.

In addition, the Assistant Secretary—Water and Power Development—exercises responsibilities which are not exclusive to any one of the Department's operating bureaus or agencies, but which involve particularly the consideration of problems of a broad, overall, or policy nature. These include the supervision of the Saline Water Conversion Program, which is described in a separate chapter in this report, and coordination, review, and preparation of Departmental comments on water and power project proposals submitted by other Federal agencies to this Department. During the fiscal year ended June 30, 1954, the Department, through this office, reviewed 40 reports of the Corps of Engineers, Department of the Army, concerned primarily with flood control and navigation; 18 reports of the Department of Agriculture concerned primarily with runoff and waterflow retardation; 19 reports of the Public Health Service, Department of Health, Education, and Welfare, concerning water pollution; and 50 applications for permits and licenses under the Federal Power Act.

The Assistant Secretary—Water and Power Development—actively participated in the negotiation of contracts for the sale of power in the Southeast and Southwest begun during fiscal year 1954. Marketing criteria for guidance in future contract negotiations for the disposal of power by the Bureau of Reclamation in the Missouri River Basin were also issued.



Policies were reviewed and formulated for the marketing of power and the preparation of adjustments in rates by the Bonneville Power Administration. Instructions were issued for a comprehensive analysis and review of the Missouri Basin program. General agreement was reached with the Corps of Engineers and the Federal Power Commission on methods and related factors for the determination of allocations of cost of multipurpose projects.

The Assistant Secretary—Water and Power Development—participated with representatives of the Department of the Interior and other interested Federal agencies in discussions with representatives of the State of California on the proposal of the California Water Project Authority for State acquisition of the Central Valley Project. He also serves as Departmental representative on the Inter-Agency Committee on Water Resources which replaces the former Federal Inter-Agency River Basin Committee. The purpose of the reorganized committee is to provide for the establishment of policies and procedures for facilitating the coordination of interests and programs of the various Government agencies concerned with water resource development.

The residual functions of the Defense Electric Power Administration, which was abolished as of the close of business on June 30, 1953, were transferred to the Office of Assistant Secretary—Water and Power Development. The major functions remaining pertain to the E-5 rated program and the Electric Power Goal No. 55.

The Office of the Assistant Secretary—Water and Power Development—is the allotting agency for the E-5 program consisting of 89 generating units, with nameplate ratings totaling 10,721,000 kilowatts to be installed on or before June 30, 1956. These E-5 rated units are essential to adequately furnish interim, firm, and backup electrical power to Atomic Energy Commission installations.

The approved Electric Power Goal No. 55 provided for the expansion of generating facilities by 41 million kilowatts for the 4 years 1952-55, scheduled for completion by December 31, 1955, and 1 million kilowatts for certain special defense related projects to be completed in 1956. This goal has been filled with installations presently scheduled or in operation and was placed under suspension December 3, 1953. No new applications for certificates of necessity for accelerated tax amortization have been certified since this date. However, scope and time amendments to all projects previously certified are eligible for consideration under Electric Power Goal No. 55. There have been granted 668 certificates involving 20,126,605 kilowatts at an estimated cost of \$3,852,589,102 for electric utilities, and 32 certificates for 505,150 kilowatts at an estimated total cost of \$111,525,770 for industrial power projects.

# Bureau of Reclamation

Wilbur A. Dexheimer, *Commissioner*



## INTRODUCTION

**T**HE Bureau of Reclamation made substantial contributions to the economic structure of the Nation during the 1954 fiscal year.

Construction work went forward under a budget of \$186,000,000, which resulted in the addition of about 2,200,000 acre-feet of water storage capacity in new reservoirs, irrigation facilities for about 322,000 acres of land, and the installation of about 297,250 kilowatts of hydroelectric generating capacity. Operation and maintenance continued satisfactorily during the year with four projects or units of projects being turned over to water users' organizations for operation making 97 units now under the direct administration of the local contracting bodies.

Renewed emphasis was placed on local participation and responsibility at all levels of planning, construction, and operation and maintenance.

Concurrently, numerous organizational changes were effected to provide greater efficiency and economy in Bureau of Reclamation operations in 17 Western States and Alaska. The technical aspects of irrigation and power operations and project investigations were transferred to the Bureau's Denver offices, and these activities, together with facilitating services which had previously been operated independently, were combined with design and construction functions to constitute the office of the Assistant Commissioner and Chief Engineer at Denver.

The consolidation of these technical activities made possible improved efficiency and reduced costs, and permitted the implementation of more uniform policies and procedures in the Bureau's planning, design, construction, and operation and maintenance work. At the same time the Commissioner retained policy direction and responsibility in the Washington office with Assistant Commissioners for Administration and Irrigation and Power.

## DESIGN AND CONSTRUCTION

In fiscal year 1954 an investment of \$148 million in new construction of irrigation and power facilities was added to the Bureau of Reclamation's projects in the West and in Alaska. These facilities included concrete and earth dams, power and pumping plants, irrigation canals and their extensive lateral systems, electric transmission lines, and other works which will contribute materially to the conservation and development of the Nation's land and water resources.

Construction completed during the year added about 2,200,000 acre-feet of water storage capacity in new Bureau of Reclamation project reservoirs, 297,250 kilowatts of hydroelectric generating capacity, 700 miles of canals, pipelines and laterals, and more than 100 miles of major electric transmission lines.

The total value of all contracts awarded in the year amounted to about \$65 million, comprising the face value of over 250 separate contracts for construction, materials, equipment and supplies. Construction contracts comprised about \$57 million, or about 87 percent, of this total contract aggregate. Construction contracts in force at the end of the fiscal year totaled about \$194 million.

The year's construction accomplishment provided irrigation facilities for about 322,000 acres of land. Construction will continue during the next fiscal year on 30 projects and 16 units of the Missouri River Basin project, as well as preconstruction activities on authorized work not yet approved by the Congress for construction. The 1955 construction program will provide for the completion of irrigation facilities to supply new and supplemental water supplies to an additional 307,000 acres and for an increased hydrogenerating capacity of 241,500 kilowatts.

The year was highlighted by completion of Canyon Ferry Dam, a large concrete dam on the Missouri River in Montana, and by the placing in service of its 50,000 kilowatt powerplant; by completion of Jamestown Dam, an earth dam in North Dakota, nearly a year ahead of schedule; by the addition of 104,750 kilowatts of power capacity on the Colorado-Big Thompson project in Colorado through the completion of the Flatiron power and pumping plant and Pole Hill powerplant; by "holing through" of the 4.5-mile long Eklutna Tunnel, a major feature of the Eklutna project in Alaska; and by placing in full service of the Hungry Horse powerplant in Montana, an important unit in the multiple-purpose development of the water resources of the Columbia River and its tributaries. Other notable accomplishments included the completion of Trenton Dam and Bartley Diversion Dam, both on the Missouri River Basin project in Nebraska, and the construction of irrigation facilities to serve about 55,000 acres of land on the Columbia Basin project in Washington.



## CONTRACT AWARDS

Listed in table 1 are major construction and supply contracts (more than \$1 million) awarded by the Bureau of Reclamation in fiscal year 1954. Among the features for which contracts were awarded were Monticello Dam on the Solano project in California, Wanship Dam on the Weber Basin project in Utah, the Chandler power and pumping plant on the Yakima project in Washington, and 108 miles of pipelines for the Delano-Earlimart irrigation district on the Central Valley project in California.

TABLE 1.—Major Bureau of Reclamation contracts awarded in fiscal year 1954

Feature	Project	Amount of award
Monticello Dam	Solano	\$7,628,991
Completion of Webster Dam	Missouri River Basin	6,148,684
19 miles of pipelines for Davis aqueduct	Weber Basin	3,902,977
Steel towers for 204 miles of Big Bend-Granite Falls 230-kilovolt transmission line.	Missouri River Basin	2,626,913
57.4 miles of pipelines for unit 1, Delano-Earlimart irrigation district, Friant-Kern Canal.	Central Valley	2,606,538
Wanship Dam	Weber Basin	2,423,004
51.4 miles of pipelines for unit 3, Delano-Earlimart irrigation district, Friant-Kern Canal.	Central Valley	2,298,483
Chandler power and pumping plant	Yakima	1,957,713
Constructing foundations and erecting steel towers for 204 miles of Big Bend-Granite Falls 230-kilovolt transmission line.	Missouri River Basin	1,930,516
127 miles of laterals, sublaterals, wasteways, and drains, and 5 miles of pipelines for East low canal laterals.	Columbia Basin	1,676,547
Camino Tunnel and conduit	Central Valley	1,398,418
69.4 miles of laterals, sublaterals, and wasteways and 5.5 miles of pipelines, Potholes East Canal.	Columbia Basin	1,383,097
36.2 miles of Cambridge Canal, laterals, sublaterals, and drains.	Missouri River Basin	1,224,616
24 miles of laterals and 5.1 miles of pipelines for Potholes East Canal.	Columbia Basin	1,063,159

Principal features completed on Bureau of Reclamation projects in fiscal year 1954 are shown in table 2. The listing includes 5 storage dams, 2 diversion dams, 4 powerplants in full production, 704 miles of canals, pipelines, and laterals, 102 miles of transmission lines, and 9.6 miles of railroad relocation.

TABLE 2.—Principal features completed on Bureau of Reclamation Projects in fiscal year 1954

Feature	Project	State
Canyon Ferry Dam and powerplant	Missouri River Basin	Montana.
Jamestown Dam	do	North Dakota.
Trenton Dam	do	Nebraska.
Bartley Diversion Dam	do	Do.
Webster Dam foundation	do	Kansas.
92 miles Angostura Canal, laterals, and drains	do	South Dakota.
82 miles transmission lines	do	Do.
33 miles canals for Bostwick division	do	Nebraska-Kansas.
36 miles laterals for Cambridge Canal	do	Nebraska.
9.6 miles railroad relocation at Kirwin Dam	do	Kansas.
Fort Clark pumping plant	do	North Dakota.
0.38-mile-long Tosten Tunnel	do	Montana.

TABLE 2.—Principal features completed on Bureau of Reclamation Projects in fiscal year 1954—Continued

Feature	Project	State
Flatiron power and pumping plant and Afterbay Dam.	Colorado-Big Thompson....	Colorado.
Pole Hill powerplant.....	do.....	Do.
Willow Creek pumping plant.....	do.....	Do.
8.4 miles St. Vrain supply canal.....	do.....	Do.
2 miles Willow Creek pump canal.....	do.....	Do.
2.6 miles penstocks for Pole Hill and Flatiron powerplants.	do.....	Do.
Hungry Horse powerplant.....	Hungry Horse.....	Montana.
23 miles main canals.....	Columbia Basin.....	Washington.
279 miles laterals.....	do.....	Do.
14.5 miles pipelines.....	do.....	Do.
46 miles pipelines.....	Cachuma.....	California.
Camp Creek diversion dam.....	Central Valley.....	Do.
0.55-mile-long Camp Creek Tunnel.....	do.....	Do.
82 miles laterals for Madera Canal distribution system.	do.....	Do.
20 miles Folsom-Elverta transmission line.....	do.....	Do.
29 miles laterals for Mohawk Canal distribution system.	Gila.....	Arizona.
21 miles pipelines for Coachella Valley distribution system.	All-American Canal.....	California.
31 miles pipelines for San Jacinto-San Vicente aqueduct.	San Diego.....	Do.
7 miles Means and Eden Canals.....	Eden.....	Wyoming.
Picacho Arroyo North Branch Dam.....	Rio Grande.....	New Mexico.
Picacho South Dam.....	do.....	Do.
Rehabilitation of Vermejo project dams.....	Vermejo.....	Do.
Channelization 8.7 miles Rio Grande.....	Middle Rio Grande.....	Do.

## PROGRESS OF CONSTRUCTION

On the Columbia Basin project in Washington construction proceeded on the irrigation systems which will serve large blocks of land from completed main canals. Irrigation facilities, including 25 small pumping plants, were completed during the year to provide water to about 186,000 acres of land.

Hungry Horse project construction in Montana was highlighted by the placing in service of the remaining two of four 71,250-kilowatt generators in the Hungry Horse powerplant, bringing the plant to its full capacity of 285,000 kilowatts. Also in Montana, Canyon Ferry Dam and its 50,000-kilowatt powerplant, features of the Missouri River Basin project, were completed, the plant being placed in full service by April 1954.

In Idaho, good progress was made in the construction of the Palisades Dam, largest of the Bureau's earth dams, and its associated 114,000-kilowatt powerplant.

Despite construction difficulties caused by repeated flooding of the contractor's cofferdams, the rehabilitation of the Savage Rapids Dam on the Grants Pass project in Oregon, was essentially completed to allow 1954 irrigation operations to proceed on schedule.

On the Central Valley project in California the Camp Creek diversion dam was completed and construction continued rapidly on the extension of the irrigation distribution systems under the Friant-Kern

and Madera Canals. Laterals totaling 82 miles in length were completed on the Madera system and construction of laterals on the extensive Delano-Earlimart irrigation district under the Friant-Kern Canal were brought to new high levels of completion by year's end. Nimbus Dam neared completion by the end of the year, and construction was continued on the project's Nimbus and Folsom powerplants.

Cachuma project construction in California was noted by completion of 46 miles of pipelines for the project's irrigation systems. On the project's Tecolote Tunnel the Bureau was faced with one of the most difficult construction problems it had encountered in recent years. Water temperatures of 112° and humidity of 100 percent at the working face stopped excavation of the remaining 4,700 feet of the 6-mile-long tunnel. At year's end installation of new pumping and dehumidifying facilities was under way, with the expectation that excavation of the tunnel could proceed without further delays.

In southern California, 21 miles of pipelines were completed on the irrigation lateral systems of the Coachella Valley distribution system of the All-American Canal system. Also in southern California, laying of the 61-mile-long second barrel of the San Jacinto-San Vicente aqueduct on the San Diego project was virtually completed at year's end.

In Arizona, on the Gila project, 29 miles of irrigation laterals of the Mohawk distribution system were completed, and the Dome Canal and the first unit of the Dome distribution system were virtually finished.

All existing contracts for channelizing of the Rio Grande on the Middle Rio Grande project in New Mexico were completed during the year and rehabilitation of 140 miles of drains approached completion by the end of the fiscal year. Good progress was made during the year on the rehabilitation of dams, canals, and laterals on the Vermejo project, also in New Mexico.

On the Weber Basin project in Utah, the 3-mile-long Gateway Tunnel was "holed through" in March 1954. Wanship Dam and the Davis aqueduct on the project were placed under construction.

In addition to completion of Canyon Ferry Dam and powerplant, construction on the Missouri River Basin project was notable for the completion of Jamestown Dam in North Dakota, and Trenton Dam and Bartley diversion dam in Nebraska. Also completed on the project were 30 miles of the Angostura Canal and 62 miles of laterals and drains in South Dakota; 33 miles of canals in Nebraska and Kansas; and 36 miles of irrigation laterals under the Cambridge Canal in Nebraska. In Kansas, the 9.6-mile-long railroad relocation at Kirwin Dam was completed, and construction began on the main embankment



of Webster Dam, following completion of the dam's foundation earlier in the year.

Progress was made on the large network of electrical transmission lines which will transmit energy from powerplants of the Bureau of Reclamation and Corps of Engineers on the Missouri River Basin project. During the year 82 miles of transmission lines were completed and an additional 510 miles of lines were under construction. In May 1954, a contract was awarded for an additional 204 miles of lines. Associated with these transmission lines was the virtual completion of construction on 20 substations.

On the Colorado-Big Thompson project in Colorado, Willow Creek pumping plant on the western slope of this transmountain diversion development was completed. On the eastern slope the Pole Hill powerplant and Flatiron power and pumping plant (total capacity of 104,750 kilowatts) were placed in service on the project. Also finished was the 9-mile-long St. Vrain supply canal. With completion of these major facilities, the \$160 million project, on which construction was begun in 1938, was essentially finished to give full service to water and power users.

Alcova powerplant (36,000 kilowatts) on the Kendrick project in Wyoming was brought to near completion at the end of June 1954.

In Alaska, on the Eklutna project, the 4.5-mile-long Eklutna Tunnel was essentially completed at the end of the fiscal year. Construction on the project's 30,000-kilowatt Eklutna powerplant and Anchorage substation continued.

The Bureau continued its efforts to develop and administer its safety program for the protection of personnel against occupational hazards. While there was a slight decrease in the number of accidents, the significant importance was the progress made in reducing the severity of occupational injuries. In construction operations the severity rate was reduced 59 percent below the 1953 rate.

## DESIGN ACTIVITIES AND DEVELOPMENTS

The design engineering force experienced sharp staffing reductions during the year, but the Bureau continued to meet the pressures of design work. The Denver engineering offices completed designs and specifications for 124 major construction contracts. The average cost for these engineering services as related to the overall Bureau construction and rehabilitation program for fiscal year 1954 was 3.8 percent.

Progressive developments were made in dams design. For concrete arch dams the use of increased limiting stress in design, made

possible through research and improved practices in control of concrete production, will permit the reduction of 20 percent of the total yardage of mass concrete, a substantial savings in construction costs.

Use in design of steel frames, insulated metal wall panels, and metal roof decking for power and pumping plant superstructures resulted in reduction of construction costs, and accelerated the initial operation of the plants. The use of rivets for shop fabrication and field erection of steel structures was virtually eliminated in design—all fabrication and erection is now done by welding, a significant factor in reducing construction costs. To effect further reductions in design and construction costs, power and pumping plant superstructures under design were replaced by the semiopen or outdoor type of building, and the expensive gantry-type crane replaced by a bridge-type crane.

Further economies were achieved by the standardization of design of steel towers for electrical transmission lines. During the year the price of aluminum was reduced, and as the supply became plentiful aluminum pipe was incorporated in the design of buses for electrical power and transmission systems. This has resulted in a significant saving in the cost of bus construction.

A highlight of the year was the confirmation of design of the Bureau's reversible pump turbine in the Flatiron power and pumping plant on the Colorado-Big Thompson project. Hydraulic acceptance tests of the unit indicated that warranted efficiency and capacity were exceeded by substantial margins. The Flatiron installation is the first of its kind in the United States. It is used both in pumping water for irrigation and for generation of power during periods of maximum kilowatt demand.

## SPECIFICATION REQUIREMENTS

Revisions of specifications requirements were made during the fiscal year leading to improved administrative procedures and performance in construction by contractors engaged in reclamation work. To achieve greater uniformity in Government contract procedure, the Bureau initiated the use of the new standard Government forms for construction contracts. As assistance to both bidder and Bureau engineers, a copy of the construction contract form is now incorporated in each copy of the specifications issued by the Bureau.

Where indemnity bonds are required for work on the right-of-way of railroads or the right-of-way of other utilities, a new practice begun during the fiscal year requires that construction specifications contain a description of the types and amounts of the bonds required. This indemnity information is of considerable assistance to bidders in that they are informed of the bond requirements before bidding.

To provide for a more equitable allowance in the contractor's negotiation for contract adjustments, the Bureau's 10 percent maximum allowance for overhead, superintendence, general expense, and profit was changed to 15 percent. This new allowance is in consonance with present-day costs of doing business and parallels amounts currently allowed by other contracting agencies.

Throughout the fiscal year good competition was experienced under Bureau construction specifications and invitations for equipment and materials. Low bids received were generally near or below the engineers' estimates. European manufacturers continued to bid on Bureau equipment and materials requirements including firms in Switzerland, Italy, Austria, and France. In accordance with the "Buy American Act," a 25 percent differential was added to all foreign bids before they were compared with domestic bids.

## RESEARCH ACTIVITIES

During the fiscal year the Bureau's engineering laboratories in Denver assisted in the solution of a wide variety of complex problems intrinsic in the development of reclamation structures and in their operation and maintenance.

In concrete materials investigations the laboratories developed a material having air-entraining, retarding, and plasticizing properties which shows promise of permitting a substantial reduction in the water requirements of mass concrete. An accelerated test was also developed to determine the relative resistance of concrete to disintegration due to attack by sulfates in soil and water.

A meter device, developed by a Bureau field engineer for measuring the in-place density of fresh concrete, was evaluated.

Also developed was an electronic device for rapidly scanning a photograph of concrete surfaces; hardened concrete can thus be analyzed for air content and for void size, spacing, and distribution.

The laboratories gave technical assistance during a hearing before the Interstate Commerce Commission on freight rates for fly ash. The hearing resulted in the granting of a low transcontinental rate for fly ash and an immediate saving to the Government of \$13,000 in concrete construction at the Bureau's Palisades Dam, and possible savings amounting to many more thousands of dollars on mass concrete dams that may be built by the Bureau in the future.

Several hydraulic devices were developed or improved for use in the field. For Platoro Dam, a reservoir headgate, cooperatively designed with project personnel, was fabricated in the laboratories.



The tidal current meter used the past two irrigation seasons for measuring flow through the Walnut Grove Channel on the Central Valley project, was improved and readied for use this year.

Hydraulic tests of a modified lower cylinder gate on one of the four Hoover Dam intake towers demonstrated changes made in its bottom shape were adequate in reducing extreme vibration during emergency closure of the gate. Reworking of the gate also caused a marked reduction in the downpull for emergency closure. The test results justify similar modifications to the lower gates in the remaining three towers.

Siphon inlets on the Gateway Canal in the Weber Basin project, Utah were designed to have sloping baffles and thus prevent animals and humans falling in the canal from being swept into the siphons. Model tests indicated, however, that two large vortexes were as hazardous as the unguarded siphons. Modifications in the design were recommended to make the safety devices operate in a desirable manner.

One bay of the fish screen structure on the Delta-Mendota Canal headworks, Central Valley project, was equipped with a louver-type fish screen which showed promise of effectively preventing passage of fish into the canal. The louver-type screen is expected to reduce operation and maintenance costs and to lower the high fish mortality rate now occurring when revolving screens are used.

A total of 175 laboratory reports covering such fields of research as testing of concrete and concrete materials, earth and foundation materials, hydraulic studies, bituminous construction, structural studies and petrographic examinations were issued during the year.

## WORK PERFORMED FOR OTHER AGENCIES

The Bureau's engineering skills and services were continued to be made available to other Federal agencies and foreign Governments. During the year 27 engineers were loaned to other Government agencies to assist in specialized work or to meet emergencies.

Technical studies were made in the design of a proposed pipeline for the city of Las Vegas, Nev. Analyses of multiple correlation problems arising in the forecasting of seasonal runoffs were made for the upper Colorado River Commission.

Laboratory assistance in the solution of several operation problems at Falcon Dam was given to the International Boundary and Water Commission. Hydraulic model studies on the proposed Gorge High Dam were conducted in the laboratories for the city of Seattle. A cooperative test program with the Atomic Energy Commission to determine the effects of radiation on asphalt materials was carried out in the laboratories during the year.

Advice and information relative to installation of various bituminous-type canal linings were made available to the Bureau of Indian Affairs.

## INTERNATIONAL COOPERATION

Technical services by the Bureau, embracing preparation of designs and estimates for several major foreign projects, were performed for foreign Governments. These projects included: Snowy Mountains hydroelectric project, Australia; Klang Gates project, Malaya; Karadj Dam, Iran; Wu Sheh Dam, Formosa; Litani project, Lebanon; and Yan Hee project, Thailand. For the Australian, Thailand, and Formosan projects, engineers from these countries received training in Bureau design and construction practices and assisted in the preparation of designs.

## CONSTRUCTION COSTS

Although construction wage rates increased about 6 percent, and material costs remained fairly steady, Bureau of Reclamation construction costs during fiscal year 1954 showed little or no variation from costs experienced during the previous fiscal year. This paralleled a nationwide trend on all types of public works, evidently the result of stiff competition in the construction industry. Many low bids were received well below carefully prepared estimates reflecting known labor, materials, and equipment costs. It can only be concluded that the low bidder's margin of profit is extremely slim, and that little or no amount is included in many of the bids for risk or contingencies.

Bidding interest in all types of Reclamation work continued to rise during the year. During the first half of the year, an average of 7 bids was received on construction specifications schedules issued by the Bureau, which amount was similar to the bidding interest shown during the last half of the previous fiscal year. However, the average number of bids per construction schedule rose to 8.8 for the second half of fiscal year 1954. This increased competitive interest was reflected by favorable prices and resulted in substantial savings to the Government.

The following table shows cost indexes for Bureau of Reclamation construction work based on the combined costs of materials and labor supplied by contractors and materials and labor supplied by the Government.

TABLE 3.—Bureau of Reclamation construction cost indexes, fiscal year 1954

Cost indexes based on January 1940 costs=\$1	July 1953	January 1954	June 1954
Dams:			
Earth.....	\$2.20	\$2.20	\$2.10
Concrete.....	2.30	2.20	2.15
Pumping plants:			
Building and equipment.....	2.45	2.55	2.55
Structures and improvements <sup>1</sup> .....	2.70	2.75	2.75
Equipment.....	2.25	2.35	2.35
Pumps and prime movers.....	2.30	2.40	2.45
Accessory electric and miscellaneous equipment.....	2.15	2.20	2.25
Discharge pipes.....	2.70	2.85	2.80
Canals and conduits:			
Canals.....	2.45	2.45	2.40
Conduits (tunnels, free flow, concrete lined).....	2.55	2.60	2.55
Laterals and drains.....	2.90	2.75	2.70
Powerplants, hydro:			
Building and equipment.....	2.40	2.45	2.45
Structures and improvements <sup>1</sup> .....	2.70	2.70	2.70
Equipment.....	2.30	2.35	2.35
Turbines and generators.....	2.30	2.35	2.40
Accessory electrical equipment.....	2.20	2.25	2.25
Miscellaneous equipment.....	2.25	2.30	2.30
Penstocks.....	2.70	2.85	2.80
Transmission switchyards and substations.....	2.40	2.55	2.55
Transmission lines (wood pole 115 kilovolts).....	2.20	2.15	2.10
Transmission lines (steel tower 230 kilovolts).....	2.25	2.25	2.25
Permanent general property: Buildings.....	2.60	2.60	2.60
Roads and bridges:			
Primary roads.....	2.50	2.35	2.30
Secondary roads, unsurfaced.....	2.25	2.10	2.05
Bridges (steel).....	2.70	2.75	2.75
Composite index.....	2.45	2.40	2.35

<sup>1</sup> Indexes for structures and improvements on pumping plants and powerplants are based on reinforced concrete structures.

## DRAINAGE AND GROUND-WATER PROBLEMS

The Bureau's drainage and ground-water program encompasses activities from the earliest planning stages of a project, through construction, and constantly thereafter in project operation. Drainage is requisite to preservation of productivity of irrigated lands.

Significant progress was made during the fiscal year, both in the development or appraisal of practical new techniques and in the design, construction, and rehabilitation of drainage works. For the first time in Bureau history, all planning reports now submitted fully recognize and evaluate drainage requirements and costs.

Basic drainage policy was reviewed and strengthened. An innovation was the development of a policy under which the Bureau is planning to construct, at least on two major projects, closely spaced tile drains as a federally financed feature. Formerly such drains were considered the responsibility of the farmers; if the drains were not installed the lands deteriorated. On these two projects the water users could not finance farm drain construction. The new policy makes possible the construction of some additional feasible projects.

Ground-water problems which developed on the Columbia Basin project prompted clarification of important aspects of Bureau policy. The policy now clearly recognizes a limited Bureau responsibility for



damages caused as the direct result of project operations, but does not assume responsibility resulting from irrigation of individual farms. Clarification of the Columbia Basin problem will materially assist in planning other projects.

Prompted by drought conditions, the Bureau was active during the year in ground-water explorations, in designing and developing wells for domestic water supply, in experimental wells for irrigation, and in projects where water salvage by irrigation or drainage wells is an important feature of the project plan. The entire irrigation water supply comes from ground water for some projects under construction. In the plan for a complex project in California, careful development of the ground-water resource along with the surface supply will provide control for the water table which, without such development, would be a serious and costly drainage problem.

The design and construction of drainage and ground-water facilities increased substantially as many projects undertook construction of these facilities. Drainage work on the Riverton project proceeded satisfactorily, although construction difficulties were experienced and special equipment and special provisions in contracts were necessary.

## PUBLICATIONS

The third edition of Dams and Control Works and a revised reprint of the Paint Manual were published during this year. The first publication, written to be of interest to the nontechnical reader as well as to the engineer, describes the Bureau's experience in the design and construction of storage and diversion dams, spillways, and outlet works, and discusses the scope of reclamation engineering. The Paint Manual provides information and instructions relating to painting practices, paints, and to other types of protective coatings, as applied to Bureau work.

Also published during the year was the technical record on the design and construction of Bonny Dam, a large earth dam on the Missouri River Basin project in Colorado. The comprehensive technical record of Davis Dam design and construction was submitted for printing by the Government Printing Office. Technical records for Platoro Dam and three major features of the Columbia Basin project were essentially completed at year's end. Other technical records on which major work was done and which were scheduled for issuance in the next fiscal year were those for Anderson Ranch Dam, Hungry Horse Dam, and the Tracy pumping plant, and two volumes of the four-volume report on the Colorado-Big Thompson project.

The sixth edition of the Bureau's Concrete Manual was prepared and is to be published early in the next fiscal year. The manual is an authoritative handbook of information and instruction on concrete control and construction techniques.

Three engineering monographs were published during the year. These describe the Bureau's design criteria for concrete gravity and arch dams, the selection of hydraulic reaction turbines, and surge control on the Coachella pipe distribution system. Two technical memoranda were published covering the subjects of compression characteristics of rolled fill materials in earth dams and pressure grouting in large dam construction.

Other publications issued during the fiscal year included a revised edition of the pamphlet on labor relations in reclamation construction, a handbook on the Bureau's safety requirements for construction by contract, and a brochure describing the Bureau's Denver engineering laboratories.

In addition, 175 laboratory reports and 20 detailed instructions for operating irrigation and power systems were issued, along with 204 construction and supply specifications.

In conjunction with the engineering assistance accorded to other governments, a number of reports were issued, notable among which were the voluminous report on the Litani River Basin development in Lebanon, an evaluation report on the Karadj project in Iran, and a report on the Wu Sheh power development in Taiwan. Other reports, such as the one on the Yan Hee development in Thailand, were in preparation at year's end.

## FOREIGN ACTIVITIES

During fiscal year 1954, the Bureau of Reclamation continued to cooperate in the technical assistance programs of the United States Government primarily at the request of the Foreign Operations Administration which took over the work formerly performed by Technical Cooperation Administration and Mutual Security Agency.

The Foreign Activities Division is responsible for administering the Bureau's participation in these programs. This assistance consisted of the training of technicians from foreign lands, rendering service to observers and visitors, sending of individual specialists and missions of Bureau technicians to other countries, and the performing of technical services such as testing, research and design and specification review for foreign water resources development. Besides the work for the Foreign Operations Administration, the Bureau also handled a number of requests for assistance from the Department of

TABLE 4.—Bureau of Reclamation storage dams, June 30, 1954

State and project	Name of dam	River	Type	Capacity	Height	Length	Volume	Year	
Arizona: Salt River.	Bartlett	Verde	Concrete multiple-arch	1 179,500	287	1,063	182,000	1939	
	Cave Creek 2	Cave Creek	do	11,000	109	1,648	18,775	1923	
	Horse Mesa	Salt	Concrete arch, powerplant	1 245,100	300	803	162,000	1927	
	Mormon Flat	do	do	1 57,900	224	505	59,900	1925	
	Roosevelt	do	Masonry arch-gravity, powerplant	1 1,398,000	280	1,125	355,800	1911	
	Stewart Mountain	do	Concrete arch, powerplant	1 69,800	207	1,260	120,500	1930	
Arizona-California: Parker-Davis.	Parker 2	Colorado	do	717,000	320	856	380,000	1938	
	Hoover (Boulder)	do	Concrete arch-gravity, 2 powerplants	31 142,000	726	1,244	4,400,000	1936	
Arizona-Nevada: Boulder Canyon.	Davis	do	Earth, powerplant	1 820,000	200	1,000	4,357,500	1950	
California: Cachuma	Cachuma	Santa Ynez	Earth	282,000	275	2,975	6,600,000	1953	
	Glen Anne	Ofstream	do	500	102	240	121,000	1953	
Central Valley	Lauro	do	do	642	110	540	472,000	1952	
	Friant 2	San Joaquin	Concrete gravity	521,000	319	3,488	2,135,000	1942	
	Keswick 3	Sacramento	do	23,800	159	1,046	197,000	1945	
	Martinez	Ofstream	do	7,600	38	1,200	183,450	1947	
	Nimbus	American	Earth, concrete overflow section	7,600	76	1,093	205,000	(*)	
	Shasta	Sacramento	Concrete curved-gravity, embankment wing, powerplant	4,493,000	602	3,460	6,541,000	1945	
Orland	Sly Park	Sly Park Creek	Earth, rock	47,130	190	760	657,000	(*)	
	East Park	Little Stony Creek	Concrete arch-gravity	51,000	139	226	15,745	1910	
Solano	Stony Gorge	Stony Creek	Concrete slab-and-buttress	1 50,200	359	868	43,100	1928	
	Monticello	Putah Creek	Concrete arch	1 600,000	295	1,000	270,000	(*)	
Colorado: Colorado-Big Thompson	Carter Lake	Ofstream	Earth (2 dikes)	117,000	200	1,235	2,900,000	1952	
	Dixon Canyon	do	Earth	(9)	240	1,215	3,094,000	1949	
Colorado: Big Thompson	Platron	do	do	19,000	70	1,730	364,500	1953	
	Granby	Colorado	do	546,000	245	883	2,901,300	1950	
	Green Mountain	do	Earth, powerplant	194,000	300	1,150	4,406,000	1948	
	Horseooth	Ofstream	Earth	147,000	130	1,010	1,890,000	1949	
	Marys Lake 2	do	Earth	700	40	1,800	60,500	1950	
	Olympus 3	Big Thompson	Earth (2 dikes), powerplant	2,850	60	1,850	300,000	1949	
	Rattlesnake	Ofstream	Concrete gravity, embankment wing	2,000	105	1,080	408,000	1952	
	Shadow Mountain	Colorado	Earth	15,000	44	600	210,000	1946	
	Soldier Canyon	Ofstream	do	(6)	220	1,420	3,288,000	1949	
	Spring Canyon	do	do	(6)	215	1,115	2,213,000	1948	
	Willow Creek	do	Willow Creek	do	135	1,075	384,000	1953	
	Fruitgrowers Dam	Alfalfa Run	do	do	55	1,520	135,500	1938	
	Mancoes	Jackson Gulch	do	do	10,000	181	1,895	1,988,000	1948
	Pine River	do	do	do	129,700	162	4,010	3,738,000	1947
	Uncompahgre	Vallecito	Pine	do	1 106,200	206	675	1,115,100	1931
	San Luis Valley	Taylor Park	Taylor	do	60,000	165	1,538	909,884	1952



Idaho: Minidoka.....	Snake.....	Concrete gravity, embankment wings.....	94	5,227	313,600	1927
	American Falls.....	do.....	70	4,920	191,000	1911
	Jackson Lake.....	Earth with concrete, powerhouse sec- tion, powerplant.....	86	4,475	257,300	1906
	Mimidoka ?.....	Earth.....	118	1,170	541,600	1939
	Grassy Lake.....	do.....	91	9,448	464,000	1938
	Island Park.....	Snake, Henry's Fork.....	496	1,350	9,653,300	1950
	Anderson Ranch.....	Boise, South Fork.....	354	1,150	636,000	1915
Idaho-Oregon: Boise.....	Arrowrock.....	Concrete arch-gravity.....	165	749	56,400	1931
	Cascade.....	Earth.....	74	4,000	1,245,000	1908
	Deadwood.....	Concrete arch.....	46	7,200	1,240,000	1908
	Deer Flat, Upper.....	do.....	16	950	22,500	1908
	Deer Flat, Lower.....	do.....	260	2,100	13,571,000	(*)
	Deer Flat, Middle.....	do.....				
	Pallsades.....	South Fork, Snake River.....	204	11,000	8,917,000	1951
Idaho-Wyoming: Pallsades.....	Cedar Bluff.....	Smoky Hill.....	170	12,600	9,180,000	(*)
Kansas: Smoky Hill division (Missouri River basin).....	Kirwin.....	North Fork, Solomon River.....	108	10,600	5,500,000	(*)
Kansas-Colorado: Solomon division (Missouri River basin).....	Webster.....	do.....	160	9,265	8,530,000	1951
St. Francis (Missouri River basin).....	Bonny.....	Earth, rock.....	65	2,550	1,106,000	1910
Montana: Bitter Root.....	Como.....	do.....	564	7,050	3,086,200	1952
Hungry Horse.....	Hungry Horse.....	Concrete arch-gravity, powerplant.....	42	2,070	142,800	1937
Huntley.....	Anita.....	Earth.....	111	2,070	2,105,000	1939
Milk River.....	Fresno.....	do.....	28	9,900	232,600	1915
	Nelson.....	Earth (5 dikes).....	96	1,086	227,600	1921
	Sherburne Lakes.....	Earth.....	196	960	167,500	1929
Sun River.....	Gibson.....	Concrete arch.....	50	9,180	599,300	1921
	Pishkun.....	Earth (8 dikes).....	93	650	254,186	1911
	Willow Creek.....	Earth, semihydraulic fill.....	220	1,010	414,700	1954
	Canyon Ferry.....	Concrete gravity.....	205	4,300	5,375,000	(*)
	Tiber.....	Earth, rock.....	134	2,603	1,951,000	1950
Helena-Great Falls division (Missouri River basin).....	Enders.....	Earth.....	180	5,630	2,883,000	1950
Lower Marias division (Mis- souri River basin).....	Medicine Creek.....	do.....	95	7,800	8,130,000	1954
Nebraska: Frenchman-Cambridge divi- sion (Missouri River basin).....	Trenon.....	do.....	87	5,508	1,422,000	1946
	Box Butte.....	do.....	135	560	586,200	1927
	Guernsey.....	Earth, powerplant.....	30	3,100	240,600	1913
	Lake Alice, upper.....	Earth.....	23	2,550	119,000	1912
	Lake Alice, lower.....	do.....	63	3,700	696,100	1915
	Minatare.....	do.....	214	1,070	65,700	1909
	Pathfinder.....	Masonry arch-gravity.....	38	1,650	152,200	1909
	Pathfinder dike.....	Earth.....	80	914	356,300	1936
	Rye Patch.....	Earth, powerplant.....	162	5,400	733,100	1915
	Lahontan.....	Concrete slab-and-buttress, lake out- let regulator.....	16	109	450	1913
	Lake Tahoe ?.....	Truckee.....				

See footnotes at end of table.

TABLE 4.—Bureau of Reclamation storage dams, June 30, 1954—Continued

State and project	Name of dam	River	Type	Capacity	Height	Length	Volume	Year
Nevada-California: Truckee storage.	Boca.....	Little Truckee.....	Earth.....	41,200	116	1,629	911,900	1939
New Mexico:								
Carrisbad.....	Alamogordo.....	Pecos.....	Earth and rockfill.....	156,800	148	3,084	1,914,900	1937
	Alamogordo <sup>2</sup> .....	do.....	Earth.....	7,000	58	1,025	202,300	1891
	McMillan.....	do.....	do.....	38,700	57	2,114	234,000	1894
	Picacho South.....	Picacho Arroyo, South	do.....	6,400	29	1,620	91,000	1954
Rio Grande.....								
	Picacho North.....	Branch Arroyo, North	do.....	6,565	45	1,600	149,000	1953
	Dam No. 2.....	Branch.....	do.....	2,300	9	11,800	162,000	1954
	Dam No. 13.....	Onstream.....	do.....	4,800	15	8,200	800,000	1954
	Stubblefield (1 dike)	do.....	do.....	13,000	50	15,800	239,000	1954
	Caballo <sup>2</sup> .....	do.....	do.....	340,850	112	4,558	1,244,200	1938
New Mexico-Texas: Rio Grande.....	Elephant Butte.....	do.....	Concrete gravity, powerplant. (1940).....	1,218,540	301	1,674	629,500	1916
North Dakota:								
Heart division (Missouri River Basin).	Heart Butte.....	Heart River.....	Earth.....	450,000	174	1,850	1,222,000	1949
	Dickinson.....	do.....	do.....	16,500	69	2,225	326,000	1950
	Jamestown.....	do.....	do.....	1,460	100	1,400	960,000	1953
Missouri-Souris division (Missouri River Basin).								
Altus <sup>2</sup> .....		Red, North Fork.....	Concrete gravity, masonry-faced.....	151,700	110	1,112	70,200	1945
Oregon:								
Baker.....	Thief Valley.....	Powder.....	Concrete slab-and-buttress.....	17,400	70	390	6,288	1932
Burnt River.....	Unity.....	Burnt.....	Earth, rock-faced.....	25,800	83	675	253,600	1938
Deschutes.....	Crane Prairie.....	Deschutes.....	Earth.....	55,300	36	285	29,700	1940
	Wickiup.....	Ochoco Creek.....	do.....	47,500	125	1,350	750,000	1921
	Wickiup-East Dike.....	Deschutes.....	do.....	187,300	100	13,860	1,852,000	1949
	Cold Springs.....	do.....	do.....	3,420	28	3,420	793,400	1949
	McKay.....	Oftstream.....	do.....	150,000	117	3,450	850,000	1908
	Agency Valley.....	McKay Creek.....	Earth, concrete-faced.....	173,800	180	2,700	2,363,800	1927
	Warm Springs.....	Malheur, North Fork.....	Earth.....	59,900	110	1,850	645,300	1935
	Clear Lake.....	Malheur, Middle Fork.....	Concrete arch.....	192,400	106	469	19,500	1919
	Gerber.....	Lost.....	Earth.....	527,000	39	840	63,400	1910
	Link River.....	Miller Creek.....	Concrete arch.....	194,300	88	485	11,900	1925
	Owyhee <sup>2</sup> .....	Link.....	Concrete slab-and-buttress, lake outlet regulator.....	1,873,000	22	435	2,200	1921
		Owyhee.....	Concrete arch-gravity.....	1,120,000	417	833	537,500	1932
Oregon-Idaho: Owyhee.....								
South Dakota:								
Cheyenne division (Missouri River Basin).	Angostura.....	Cheyenne.....	Concrete gravity, embankment wing.....	220,000	187	1,900	749,600	1949
Belle Fourche.....	Pactola.....	Rapid Creek.....	Earth, rock.....	99,000	230	1,340	2,400,000	(*)
Rapid Valley.....	Belle Fourche.....	Owl Creek.....	Earth, concrete-faced.....	1,177,500	122	6,262	1,783,200	1911
Grand division (Missouri River Basin).	Deerfield.....	Castle Creek.....	Earth.....	15,700	133	825	607,400	1947
	Shadehill.....	Grand.....	do.....	467,000	145	1,900	3,800,000	1951
Texas: Colorado River.....	Marshall Ford.....	Colorado (Texas).....	Concrete gravity, embankment wings, powerplant.....	1,951,300	278	5,093	3,579,000	1942





TABLE 4A.—Bureau of Reclamation diversion dams, June 30, 1954

State and project	Name of dam	River	Type	Capacity	Height	Length	Volume	Year
Arizona: Salt River	Granite Reef	Salt	Concrete weir	3,600	18	1,128	35,000	1908
	Joint Head	do.	Concrete weir, embankment wing	200	4	2	5,400	1914
	Power Canal	do.	do.	220	8	862	16,000	1906
Arizona-California: Gila and Boulder Canyon, All-American Canal system, Yuma	Imperial	Colorado	Concrete slab-and-buttress weir, de-silting works.	17,160	23	3,475	196,790	1938
California: Orland	Leguna	do.	Rockfill weir, concrete-surfaced	1,950	10	4,780	486,800	1909
	East Park Feed Canal	Stony Creek	Concrete arch, overflow	200	28	271	1,777	1914
	Northiside	do.	Concrete weir, removable crest	80	3	370	2,700	1913
	Southside	do.	Concrete weir	140	3	895	3,600	1916
	Camp Creek	Camp Creek	Concrete, overflow weir	500	20	143	3,000	1953
Colorado: Fruitgrowers Dam	Dry Creek	Dry Creek	Concrete weir	100	5	36	242	1940
	Grand Valley	Colorado	Concrete weir, movable crest	1,425	14	543	17,980	1916
	East Canal	Uncompahgre	Concrete weir, embankment wing	330	8	764	1,009	1915
	Garnet	do.	Rockfill weir, concrete-surfaced	50	4	75	1,500	(?)
	Gunnison	Gunnison	Timber-crib weir, concrete wings, removable crest	1,000	10	244	3,200	1912
	Ironstone	Uncompahgre	Concrete gate-structure, timber-crib wing	350	8	131	155	(?)
	Loutsenhizer	do.	Timber weir	290	9	114	400	1883
	Montrose and Delta	do.	Concrete gate-structure, movable crest	450	12	68	500	1883
	Selig	do.	Timber weir, removable crest	300	10	96	500	(?)
Colorado-Big Thompson	North Poudre	Cache la Poudre	Concrete weir, embankment wing	250	18.5	200	8,700	1952
	Sweetwater	Sweetwater Creek	Rockfill weir, concrete diaphragm	77	8	80	400	1948
Idaho: Lewiston Orchards	Webb Creek	Webb Creek	do.	20	10	75	600	1948
	Black Canyon	Payette	Concrete gravity, overflow, removable crest, powerplant	1,360	111	1,039	81,204	1925
Idaho-Oregon: Boise	Boise River	Boise	Concrete and masonry weir, removable crest, powerplant	2,815	39	500	26,100	1908
	Cascade Creek	Cascade Creek	Timber-crib weir, removable crest	220	6	217	3,068	1937
	Cross Cut	Henry's Fork	Concrete weir	590	10	457	7,375	1937
Montana: Bitter Root	Rock Creek	Rock Creek	Timber-crib weir	320	6	30	150	1910
	Frenchtown	Missoula	Earth (includes 3 dikes), nonoverflow	170	13	489	12,176	1936
	Huntley	Yellowstone	Concrete weir	400	8	250	1,674	1934
	Milk River	Milk	Timber-crib weir, removable crest, embankment wings	1,450	22	8,154	87,355	1910
	Saint Mary	Saint Mary	Concrete weir	580	6	198	1,280	1915
	Swift Current	Swift Current Creek	Earth, timber-crib core, nonoverflow	13	4	800	98,400	1915
	Vandallia	Milk	Concrete slab-and-buttress weir, movable crest, embankment wing	250	32	2,350	15,207	1917
	Sun River	Sun, North Fork	Concrete arch, overflow	1,400	114	261	6,466	1915
Montana-North Yellowstone	Lower Yellowstone	Yellowstone	Timber-crib weir, embankment wings	840	4	800	22,500	1910

Nebraska:	Superior-Courtland	Republican	Concrete ogee weir, embankment wings.	169	21	8, 075	178, 000	1950
Bostwick division, Missouri River Basin.	Dunlap	Niobrara	Concrete weir, embankment wing.	220	6	577	5, 100	1945
Mirage Flats.	Cambridge	Republican	do.	325	33	432	13, 850	1948
Frenchman-Cambridge Missouri River Basin.	Bartley	do	do.	130	35	1, 015	98, 000	1954
Nebraska-Wyoming-North Platte.	Horse Creek	North Platte	do.	430	6	720	5, 280	1923
do.	Walden	do	do.	3, 700	11	2, 460	81, 700	1909
Nevada: Newlands.	Carson River	Carson	Concrete gate-structure.	1, 950	14	241	2, 707	1905
do.	Derby	Truckee	Concrete gate-structure, embankment wing.	1, 500	15	1, 331	36, 572	1905
New Mexico-Texas: Rio Grande.	American 4	Rio Grande	Concrete weir, movable crest, embankment wings.	1, 110	5	9, 306	67, 667	2 1938
do.	Leasburg	do	Concrete weir, embankment wing.	600	6	2, 865	22, 500	1908
do.	Messilla	do	do.	890	4	3, 445	23, 600	1916
do.	Percha	do	Concrete weir, movable crest, embankment wings.	350	9	2, 720	43, 238	1917
do.	Percha Arroyo	Percha Arroyo	Earth, nonoverflow.	30, 000	19	2, 489	192, 884	1939
do.	Riverside	Rio Grande	Concrete weir, movable crest, embankment wings.	1, 000	6	3, 370	145, 150	1928
do.	Fort Sumner	Pecos	Concrete weir.	100	35	715	24, 660	1951
Oregon:	North Canal	Deschutes	Concrete arch-gravity, overflow.	1, 000	28	293	84, 900	2 1912
do.	Savage Rapids	Rogue	Concrete, gravity and multiple arch.	207	40	392	5, 600	2 1921
do.	Feed Canal	Umatilla	Concrete weir, embankment wing.	350	4	2, 100	14, 100	1907
do.	Maxwell	do	Concrete and timber-crib weir, embankment wing.	140	5	400	464	1915
Vale	Three Mile Falls	do	Concrete multiple-arch, overflow wing.	360	23	915	5, 068	1914
do.	Harper	Malheur	Concrete gate-structure, embankment wing.	660	21	914	9, 258	1929
Oregon-California: Klamath.	Lost River	Lost	Concrete multiple-arch, overflow, embankment wings.	1, 200	26	675	19, 915	1912
do.	Lower Lost River	do	Concrete slab-and-buttress.	810	12	324	689	1921
do.	Malone	do	Concrete gate-structure, embankment wing.	-----	18	515	24, 600	1923
do.	Miller	Miller Creek	Concrete weir, removable crest, embankment wings.	-----	5	290	1, 615	1924
South Dakota: Belle Fourche.	Belle Fourche	Belle Fourche	Concrete weir, embankment wing.	1, 635	18	2, 623	35, 700	1907
Utah:	Hyrum	Little Bear, East Fork	Rockfill weir, embankment wing.	90	1	520	2, 900	1937
do.	Moon Lake	Duchesne	Concrete weir, embankment wings.	220	6	1 220	4, 000	1939
do.	Canal	do	do.	-----	-----	-----	-----	-----
do.	Murdoek	Provo	Concrete weir, overflow, embankment wing.	5, 000	10	100	9, 036	1950
do.	Weber River	Weber	Concrete weir, embankment wings.	1, 000	10	1, 795	15, 400	1931
do.	Indian Creek	Indian Creek	do.	750	9	1, 350	15, 200	1913
do.	Crossing	do	do.	-----	-----	-----	-----	-----
do.	Spanish Fork	Spanish Fork	Concrete weir.	500	13	74	1, 300	1908

See footnotes at end of table.

TABLE 4A.—Bureau of Reclamation diversion dams, June 30, 1954—Continued

State and project	Name of dam	River	Type	Capacity	Height	Length	Volume	Year
Washington: Okanogan Yakima	Salmon Creek	Salmon Creek	Concrete weir, embankment wing.	300	5	130	800	1909
	Easton <sup>2</sup>	Yakima	Concrete gravity, overflow, movable crest.	1,320	51	248	5,760	1929
	Prosser <sup>6</sup>	do.	Concrete weir.	( <sup>6</sup> )	6	768	1,026	<sup>2</sup> 1904
	Roza	do.	Concrete weir, movable crest.	2,200	34	486	21,711	1939
	Sunnyside	do.	Concrete weir, embankment wing.	1,320	6	1 000	1,809	1907
Wyoming: Riverton Shoshone	Tieton	Tieton	do.	320	2	510	1,368	1908
	Wind River	Wind River	do.	2,200	19	2,464	123,860	1923
	Corbett	Shoshone	Concrete slab-and-buttress weir, embankment wing.	1,000	12	938	10,200	1908
	Willwood	do.	Concrete gravity, overflow, embankment wing.	320	41	476	22,119	1924

<sup>1</sup> Overflow—length of overflow section only.

<sup>2</sup> Non reclamation construction.

<sup>3</sup> Storage and diversion—dam classified according to its principal feature.

<sup>4</sup> Contributory dam—nonreclamation, furnishing water supply or power for irrigation of Bureau of Reclamation projects.

#### DEFINITIONS

Capacity: Second-foot of diversion provided by canal headworks at dam.

Height: Feet between original streambed and highest controlled water surface.

Length: Feet of barrier in dam and integral features constructed between natural abutments.

<sup>5</sup> Dam—indicates data applicable to dam only.

<sup>6</sup> Power dam—water supply for generation of power.

<sup>7</sup> Rehabilitated by the Bureau of Reclamation in 1953.

Volume: Cubic yards of all material in dam and its appurtenant features.

Year: Date original construction was completed.



State, UNRWA, IBRD, and other agencies directly concerned with water resources development throughout the world. The Department of State requests were under the authority of Public Law 402 and financed by funds made available by requesting government.

The Training Administration Branch handled 135 inservice trainees during fiscal year 1954, which included engineers and government officials from 24 different countries. Also accommodated were 20 official observers from 15 different countries and 102 accredited visitors from 26 countries. No records are kept of the numerous foreign visitors who stop unannounced at Bureau installations but who are usually given the same courteous reception accorded the programmed persons. In the Denver office alone, 131 persons from 41 countries visited the Bureau's facilities as tourists during the past fiscal year.

Among some of the outstanding visitors to reclamation projects during the year were Ambassador Mehta of India; Carl A. Bock, director, Puerto Rico Water Resources Authority; A. N. Khosla, past chairman, Central Water and Power Commission, India; Abdullah Khan, president, Helmand Valley Authority, Afghanistan; Comdr. Robert G. A. Jackson, head, Volta River Preparatory Commission, Gold Coast; Andre Coyne, engineering consultant, France; Emperor Haile Selassie, Ethiopia; and W. H. Hudson, commissioner, Snowy Mountains Hydro-Electric Authority, Australia.

Through the Technical Cooperation Branch, under the FOA program, 121 Bureau employees were on technical assistance assignments of various types during fiscal year 1954 in Afghanistan, Chile, Colombia, Costa Rica, Egypt, Ethiopia, Formosa, India, Iran, Iraq, Israel, Jordan, Lebanon, Libya, Nicaragua, Pakistan, Philippines, Turkey, and Uruguay. In addition, 13 men were sent on technical assistance missions for other agencies, including a 7-man team to advise the Thailand Government on its Yan Hee project.

Towards the close of the fiscal year, a new agreement was signed between the Department of Interior and Foreign Operations Administration, establishing new procedure for handling technical assistance. This new agreement has not as yet been implemented and its effect on future Bureau participation in the foreign assistance program is unknown.

During the year the Bureau received \$2,329,000 from other agencies to finance these technical assistance endeavors. This may be compared with \$2,438,000 for fiscal year 1953 and \$1,845,000 for fiscal year 1952.

Engineering services available in the Denver office continued to be in demand during the past year. Under the authority of Public Law 402, and at the request of Foreign Operations Administration, work was accomplished for the Snowy Mountains Hydro-Electric Authority, Australia; Wu Sheh project, Formosa; Klang Gates Dam, Ma-

laya; Kardj Dam, Iran; Litani River project, Lebanon; city of Singapore, Malaya; Electric Power Development, Inc., Japan; Peruvian School of Engineering; Greater Vancouver Water District, Canada; Central Water and Power Commission, India; Sariyar project, Turkey; Taunsa Barrage project, Pakistan; Damodar Valley corp., India; Rio Elqui project, Chile; and Chao Phya project, Thailand.

## IRRIGATION DIVISION

The Irrigation Division, formerly the Operations and Maintenance Division, is responsible for keeping irrigation water flowing down the ditch to 125,000 family-sized farms and a like number of urban and suburban units consisting of more than 7,000,000 acres on which 410,000 settlers live. This land, supplied with water from Bureau constructed works, is about one-fourth of the total irrigated land area in the Western States.

Actually, the reclamation family proper, exclusive of the municipal and industrial water benefactors, numbers almost 2,000,000.

In addition to the settlers living on the projects, at least 1,500,000 persons living in nearby towns and villages are dependent on the reclamation program.

In addition to supplying irrigation water, Bureau of Reclamation constructed works provide municipal and industrial water service to over 2,000,000 people. The Irrigation Division is also responsible for keeping these water delivery facilities on 69 projects in good repair to assure the best and most economical use of water. These facilities include 126 storage and 80 division dams, more than 19,500 miles of canals and laterals, more than 5,700 miles of drains, 386 major pumping plants, and an estimated 11,300 miles of operating roads.

### *Extension of Irrigation Service*

The 1953 total of irrigable land in the service area of reclamation projects reached 7,147,528 acres. This is an increase of 153,050 irrigable acres over the 6,994,478 acres reported in 1952. The extension of irrigation service on the Columbia Basin project, Washington, and the Central Valley project in California accounts for approximately 74 percent of the total increase. Other significant increases occurred on the Coachella and Imperial divisions of the Boulder Canyon project, California; the Frenchman-Cambridge unit, Nebraska; Missouri River Basin project; Gila project, Arizona; and the Klamath project, Oregon-California.

A total of 368 full-time and 21 part-time farm units was made available from Federal lands. Veterans were given preference under

the provisions of various preference acts for 256 units on the Columbia Basin project, 85 units on the Minidoka, 28 units on the Gila, and 20 units on the Coachella division of the Boulder Canyon project. Of the 21 part-time units 6 were available to applicants not entitled to veterans' preference.

### *Crop Production*

The 1953 harvest of crops in the service area of Federal reclamation projects was valued at \$785,939,868. This was the eighth consecutive year of crop values in excess of the one-half billion dollar mark, and brought the cumulative value of all reclamation harvests through 1953 to more than \$9.7 billion. The value of the crop was the third highest in reclamation history. However, it was \$149.7 million less than the record value of \$935.7 million produced in 1952. The decline in total value of crops was due primarily to lower unit prices received by the irrigation farmers. Tonnagewise, the 1953 harvest was the highest on record. The total tonnage produced, 25.7 million tons, was 2.1 million tons or 9 percent greater than 1952 harvest, and approximately 80 percent larger than the harvest of 10 years ago.

The \$126.92 average crop value per acre of cultivated land reflects a decline of \$28.34 from the record per acre value attained in 1952 of \$155.26. The high average value per acre for all production on a major division was \$687.32 attained on the Tieton division of the Yakima project, Washington. Fruits and nuts were highest in value per acre (\$423.46) and hay and forage were lowest (\$37.83).

The 1953 harvest of 25,711,235 tons included: 11,814,510 tons (46 percent) of hay, pasture and forage crops; 6,872,171 tons (26.7 percent) of miscellaneous field crops; 3,722,819 tons (14.5 percent) of vegetable and truck crops; 1,677,704 tons (6.5 percent) of cereal crops; 1,513,391 tons (5.9 percent) of fruits and nuts; and 110,640 tons (0.4 percent) of various seed crops. In terms of acres, the most significant crop group was hay and forage with 44.6 percent of the irrigated lands producing these crops. The effective use of the forage on the 700 million acres of rangeland in the Western States is greatly enhanced by the supplementary feed and forage crops produced on irrigated farms.

The most significant individual crop produced in 1953 was cotton which made up approximately 21 percent of the total crop value and utilized about 11 percent of the irrigated land. Alfalfa hay was the second most significant crop with 11 percent of the value and 22 percent of the acreage. The acreage and value of crops produced on each of the Federal reclamation projects is shown in tables 5 and 6.



TABLE 5.—*Projects in operation—irrigation and crop value data for the calendar year 1953*

State, project, and subdivision	Full supply projects constructed or rehabilitated by the Bureau						Temporarily suspended land <sup>2</sup>				Supplemental supply projects constructed or rehabilitated by the Bureau			
	Irrigable area for service <sup>1</sup>	Irrigated area	Land subject to construction charges		Net area in cultivation		Gross crop value	Value per acre	Irrigable area for service <sup>1</sup>	Irrigated area	Net area in cultivation	Gross crop value		
			Acres	Acres	Acres	Acres						Total	Per acre	Total
REGION 1														
<i>Idaho</i>														
Lewiston Orchards <sup>3</sup>	3,524	2,231	2,234	\$576,399	\$258.01	2,234	Acres		Acres		Acres			
<i>Idaho-Oregon</i>														
Boise:														
Big Bend irrigation district (Oregon)	1,724	1,463	1,463	74,991	51.26	1,463								
Black Canyon irrigation district, unit 1	6,880	6,437	6,610	725,183	109.71	6,610								
Black Canyon irrigation district, unit 2	51,702	45,617	45,917	2,509,153	54.65	45,917								
Boise-Kuna irrigation district	48,660	45,256	45,256	3,163,004	69.89	45,256								
Nampa and Meridian irrigation district	40,196	34,819	34,860	2,300,746	66.00	34,860								
New York irrigation district	17,826	14,343	14,343	557,530	38.87	14,343								
Settlers irrigation district	518													
Wilder irrigation district	56,558	50,649	50,651	5,886,298	116.21	50,651								
Special and Warren Act contractors														
Total, Boise project	224,064	198,584	199,100	15,216,905	76.43	199,100								
<i>Idaho-Washington</i>														
Rathdrum Prairie:														
Hayden Lake Unit <sup>3</sup>	1,087	619	619	50,276	81.22	619								
Post Falls Unit <sup>3,4</sup>	3,109	2,841	2,841	229,927	80.93	2,841								
Total, Rathdrum Prairie project	4,196	3,460	3,460	280,203	80.98	3,460								
<i>Idaho-Wyoming</i>														
Minidoka:														
American Falls Reservoir District No. 2	98,434	84,995	84,995	5,783,136	68.04	84,995								
Burley irrigation district	47,937	44,598	44,598	4,356,262	97.68	44,598								
Fremont-Madison irrigation district									112,000	100,210	100,567	\$8,232,911	\$81.86	

Minidoka irrigation district.....	71, 882	64, 378	5, 916, 263	91. 90							
North Side pumping division.....											
Special and Warren Act contractors.....											
Total, Minidoka project.....	218, 285	193, 971	16, 085, 661	82. 77			112, 000	100, 210	100, 567	8, 232, 911	81. 86
<i>Montana</i>											
Bitter Root <sup>3</sup> .....	16, 665	16, 432	496, 323	30. 05							
Frenchtown.....	4, 810	3, 871	171, 340	44. 26							
Missoula Valley <sup>4</sup> .....	977	755	17, 195	22. 33							
<i>Oregon</i>											
Arnold <sup>3</sup> .....	4, 248	2, 686	227, 849	84. 83							
Baker.....											
Burnt River.....											
Deschutes:											
Central Oregon irrigation district <sup>3</sup> .....											
Lone Pine irrigation district.....											
North unit.....	50, 000	48, 137	5, 716, 953	118. 76							
Total, Deschutes project.....	50, 000	48, 137	5, 716, 953	118. 76							
Grants Pass <sup>3</sup> .....	10, 124	6, 946	901, 910	129. 85							
Ochoco <sup>3</sup> .....	8, 500	8, 292	489, 887	59. 08							
Umatilla:											
East division.....	10, 911	7, 016	284, 475	39. 47							
South division:											
Stamfield irrigation district <sup>3</sup> .....											
Westland irrigation district.....											
West division.....	7, 246	6, 242	354, 725	56. 64							
Total, Umatilla project.....	18, 157	13, 258	639, 200	47. 45							
Vale.....	32, 000	31, 484	1, 818, 956	57. 77							
<i>Oregon-Idaho</i>											
Owyhee:											
Advancement irrigation district.....	700	578	48, 038	83. 11							
Bench irrigation district.....	2, 342	2, 240	363, 790	162. 41							
Crystal irrigation district.....	1, 280	1, 194	263, 792	220. 93							
Gem irrigation district (Idaho).....	33, 454	30, 879	2, 278, 687	74. 16							
Ontario-Nyssa irrigation district.....	5, 831	5, 685	747, 865	135. 70	450	\$6, 750	\$15. 00				
Owyhee irrigation district.....	49, 533	46, 491	3, 431, 576	73. 48							
Payette-Oregon Slope irrigation district.....	4, 659	4, 362	710, 989	162. 79	62	3, 021	48. 73				
Bridgeview irrigation district.....	6, 139	5, 806	434, 384	73. 51							
Slide irrigation district.....	1, 144	1, 103	119, 707	108. 53							
Special and Warren Act contractors.....											
Total Owyhee project.....	105, 122	98, 238	8, 387, 938	85. 48	512	9, 771	19. 08				

See footnotes at end of table.





<i>Oregon-California</i>										
Klamath:										
Main division (Oregon).....	34, 731	34, 773	3, 321, 611	95.52	440	24, 810	56.39			
Tule Lake division (California).....	43, 393	43, 393	6, 221, 900	143.38						
Special and Warren Act contractors Leased and water rental lands.....										
Total, Klamath project.....	83, 794	78, 166	9, 543, 511	122.09	440	24, 810	56.39			
Total, region 2.....	103, 225	95, 427	11, 144, 375	116.78	440	24, 810	56.39			
REGION 3										
<i>Arizona</i>										
Gila:										
Wellton-Mohawk division.....	22, 750	22, 396	5, 442, 311	243.00						
Yuma Mesa division:										
North Gila unit.....	6, 231	6, 057	1, 740, 705	287.39						
South Gila unit.....										
Yuma Mesa unit.....	20, 251	13, 920	1, 616, 033	116.07						
Total, Gila project.....	49, 232	42, 376	8, 799, 049	207.64						
Salt River.....	241, 322	212, 915	57, 501, 277	253.68						
Yuma Auxiliary.....	3, 384	2, 112	561, 166	265.70						
<i>Arizona-California</i>										
Yuma:										
Reservation division:										
Bard unit (California).....	6, 896	6, 467	1, 114, 488	172.33						
Indian lands (California).....	7, 743	5, 388	1, 185, 881	220.10						
Valley division (Arizona).....	51, 936	47, 118	16, 251, 312	344.91						
Total, Yuma project.....	66, 575	58, 950	18, 551, 781	314.58						
<i>California</i>										
Boulder Canyon:										
Coachella division.....	70, 200	47, 370	14, 363, 118	303.21						
Imperial division.....										
Total, Boulder Canyon project.....	70, 200	47, 370	14, 363, 118	303.21						
Total, region 3.....	430, 713	363, 720	99, 776, 391	264.31						

See footnotes at end of table.

TABLE 5.—*Projects in operation—irrigation and crop value data for the calendar year 1953—Continued*

State, project, and subdivision	Full supply projects constructed or rehabilitated by the Bureau					Temporarily suspended land <sup>2</sup>			Supplemental supply projects constructed or rehabilitated by the Bureau						
	Irrigable area for service <sup>1</sup>	Irrigated area	Land subject to construction charges		Net area in cultivation	Gross crop value	Net area in cultivation	Gross crop value	Value per acre	Irrigable area for service <sup>1</sup>	Irrigated area	Net area in cultivation	Gross crop value		
			Net area in cultivation	Total									Total	Per acre	Total
REGION 4															
<i>Colorado</i>															
Fruitgrowers Dam <sup>3</sup> .....		<i>Acres</i>		<i>Acres</i>		<i>Acres</i>				<i>Acres</i>		<i>Acres</i>		\$178,483	\$85.89
Grand Valley:															
Garfield gravity division.....	23,222	21,460	\$1,800,954	\$83.92	21,460										
Orchard Mesa division <sup>3</sup> .....	10,027	8,112	1,707,013	210.43	8,112										
Special and Warren Act contractors.....															
Total, Grand Valley project.....	33,249	29,572	3,507,967	118.62	29,572										
<i>Idaho</i>															
Manecos <sup>4</sup> .....															
Paxons <sup>3</sup> .....	11,500	8,900	568,364	62.66	9,070										
Pine River.....															
Pine River Indian irrigation.....															
Uncompahgre.....	72,662	57,711	3,839,956	65.44	58,679										
Preston Bench <sup>3</sup> .....															
										6,738	4,181	4,181	373,622	89.36	
<i>Nevada</i>															
Humboldt.....															
Newlands:															
North Carson division.....	7,339	4,416	220,074	50.09	22	\$396		\$18.00							
South Carson division.....	56,023	44,471	1,817,445	41.23	391	4,692		12.00							
Truckee division.....	7,149	5,241	224,173	42.95	21	336		16.00							
Total, Newlands project.....	70,511	54,128	2,261,692	42.12	434	5,424		12.50							

<i>Nevada-California</i>											
Truckee storage.....								22,986	22,986	1,628,864	70.86
<i>Utah</i>											
Hyrum.....								5,676	5,684	341,161	60.02
Moon Lake.....								58,701	58,796	1,012,548	17.22
Newton 4.....								1,898	1,918	124,257	64.78
Ogden River.....								1,898	1,898	1,690,888	103.95
Provo River: Deer Creek division.....								16,238	16,266	3,463,459	85.54
Sanpete:											
Ephraim division.....								6,733	7,133	295,537	41.43
Spring City division.....								4,990	5,778	270,354	46.79
Total, Sanpete project.....								11,723	12,911	565,891	43.83
Scotfield 4.....								14,392	15,009	826,877	55.09
Strawberry Valley:											
Highline division.....	17,637	15,984	16,221	846,149	52.16						
Spanish Fork division.....	13,787	13,298	13,401	1,006,935	75.14						
Springville-Mapleton division.....	8,924	8,200	8,226	620,564	75.44						
Total, Strawberry Valley project.....	40,348	37,482	37,848	2,473,638	65.36						
Weber River.....								90,914	90,914	9,229,823	101.52
Total, region 4.....	228,270	187,793	188,863	12,651,617	66.99	434	5,424	344,308	352,594	22,630,162	64.18
REGION 5											
<i>New Mexico</i>											
Carlsbad.....	25,055	21,935	23,108	3,318,191	143.59						
Fort Sumner 3.....	6,500	5,254	5,368	508,597	94.75						
Tucumcari.....	42,214	33,799	35,783	1,715,542	47.94						
<i>New Mexico-Texas</i>											
Rio Grande:											
Elephant Butte irrigation district (New Mexico).....	88,000	93,045	86,026	21,190,476	246.33	7,078	1,299,161			183.55	
El Paso County water improvement district No. 1 (Texas).....	67,000	66,664	63,171	16,884,426	267.28	3,493	858,802			245.86	
Hudspeth County conservation and reclamation district No. 1 (Texas).....											
Total, Rio Grande project.....	155,000	159,709	149,197	38,074,902	255.20	10,571	2,157,963			204.14	
<i>Oklahoma</i>											
W. C. Austin.....	47,810	41,937	46,831	1,683,913	35.96						

See footnotes at end of table.





Sun River:	11,084	6,884	8,474	170,449	20.11	87	1,224	14.07		
Fort Shaw division.....	83,301	66,292	76,330	1,940,850	25.43					
Greenfields division.....										
Totals, Sun River project.....	94,385	73,176	84,804	2,111,299	24.90	87	1,224	14.07		
<i>Montana-North Dakota</i>										
Lower Yellowstone:										
District No. 1 (Montana).....	37,272	31,980	31,754	1,770,300	55.75	226	8,763	38.77		
District No. 2 (North Dakota).....	19,928	16,596	16,407	854,972	52.11	189	7,346	38.87		
Leased and water rental lands.....										
Totals, lower Yellowstone project.....	57,200	48,576	48,161	2,625,272	54.51	415	16,109	38.82		
<i>North Dakota</i>										
Buford-Trenton <sup>4</sup> .....	9,461	9,084	9,331	330,028	35.37					
Missouri River Basin: Heart division, Heart Butte and Dickinson units.....										
<i>South Dakota</i>										
Belle Fourche.....	59,083	53,369	54,158	1,372,144	25.34					
Missouri River Basin: Cheyenne division, Angostura unit <sup>4</sup> .....	5,207	4,959	5,166	106,886	20.69					
Rapid Valley <sup>4</sup> .....									7,211	184,779
							8,900		7,211	25.62
<i>Wyoming</i>										
Riverton:	47,222	43,842	36,397	1,517,251	41.69	7,445	225,260	30.26		
Midvale irrigation district.....	12,297	11,055	11,055	496,773	44.94					
Third division.....										
Totals, Riverton project.....	59,519	54,897	47,452	2,014,024	42.44	7,445	225,260	30.26		
<i>Wyoming-Montana</i>										
Shoshone:										
Frannie division.....	20,083	10,483	9,639	329,058	34.14	844	13,462	15.95		
Carland division.....	41,627	33,854	33,310	1,765,395	53.00	544	14,016	25.76		
Heart Mountain division.....	26,214	23,204	23,204	1,132,864	48.82					
Willwood division.....	11,426	10,019	10,333	595,816	57.66					
Totals, Shoshone project.....	99,350	77,560	76,486	3,823,133	49.98	1,388	27,478	19.80		
Total, region 6.....	568,309	437,776	427,659	16,602,229	38.82	27,211	685,882	25.21	7,211	184,779
							8,900		7,211	25.62

See footnotes at end of table.

TABLE 5.—*Projects in operation—irrigation and crop value data for the calendar year 1953—Continued*

State, project, and subdivision	Full supply projects constructed or rehabilitated by the Bureau						Supplemental supply projects constructed or rehabilitated by the Bureau			
	Irrigated area for service 1	Irrigated area	Land subject to construction charges		Temporarily suspended land 2		Irrigable area for service 1	Irrigated area	Net area in cultivation	Gross crop value
			Net area in cultivation	Gross crop value	Per acre	Net area in cultivation				
	Acres	Acres	Acres	Total	Per acre	Acres	Acres	Acres	Total	Per acre
REGION 7										
Colorado										
Colorado-Big Thompson.....										
Nebraska										
Mirage Flats 4.....	11,657	11,204	11,312	\$1,164,207	\$102.92					
Missouri River Basin: Bostwick division: Superior-Courtland unit.....	7,940	4,376	4,376	307,642	70.30					
Frenchman-Cambridge division 3.....	16,200	10,380	10,380	620,017	69.57					
Nebraska-Wyoming										
North Platte: Gering-Fort Laramie irrigation district.....	54,845	52,980	52,980	5,227,430	98.67					
Goshen irrigation district (Wyoming).....	52,484	50,870	50,870	4,736,000	93.10					
Northport irrigation district.....	16,170	12,466	12,466	888,220	72.96					
Pathfinder irrigation district.....	10,102,824	89,974	89,974	6,388,636	71.01					
Special and Warren Act contractors.....										
Leased and water rental lands.....										
Total, North Platte project.....	226,323	206,290	205,998	17,240,286	83.69	1,202	16,092	13.39		
Wyoming										
Kendrick.....	16,475	11,966	11,966	403,551	33.72					
Total, region 7.....	278,595	244,226	244,042	19,735,703	80.87	1,202	16,092	13.39	615,000	59,237,730
Total, all regions.....	2,990,672	2,511,995	2,517,617	312,279,056	124.04	41,311	2,922,927	70.75	1,254,423	96,788,085
									615,000	59,237,730
									1,158,695	96,788,085



TABLE 5.—Projects in operation—irrigation and crop value data for the calendar year 1953—Continued

State, project, and subdivision	Special and Warren Act contractors receiving water from Bureau-constructed works				Leased and water rental lands receiving water from Bureau-constructed works				Entire area receiving full or supplemental water from Bureau-constructed works				
	Irrigable area for service 1	Irrigated area	Net area in cultivation	Gross crop value	Irrigable area for service 1	Irrigated area	Net area in cultivation	Gross crop value	Irrigable area for service 1	Irrigated area	Net area in cultivation	Gross crop value	Per acre
REGION 1													
Idaho													
Lewiston Orchards 3													
Idaho-Oregon													
Boise:													
Big Bend irrigation district (Oregon)													
Black Canyon irrigation district, unit 1													
Black Canyon irrigation district, unit 2													
Boise-Kuna irrigation district													
Nampa and Meridian irrigation district													
New York irrigation district													
Settlers irrigation district													
Wildier irrigation district													
Special and Warren Act contractors	132, 197	122, 900	123, 400	\$10, 085, 709	\$81.73								
Total, Boise project	132, 197	122, 900	123, 400	10, 085, 709	81.73								
Idaho-Washington													
Rathdrum Prairie:													
Hayden Lake unit 3													
Post Falls unit 4													
Total, Rathdrum Prairie Project													
Idaho-Wyoming													
Mimdoka:													
American Falls Reservoir District No. 2													
Buley irrigation district													
Premont-Madison irrigation district													
Mimdoka irrigation district													
North Side pumping division													
Special and Warren Act contractors	747, 530	712, 034	712, 034	55, 906, 300	78.52								
Total, Mimdoka project	747, 530	712, 034	712, 034	55, 906, 300	78.52								

See footnotes at end of table.



Owyhee irrigation district.....	49,553	46,491	46,491	3,414,597	73.45
Payette-Oregon Slope irrigation dis- trict.....	4,659	4,362	4,362	710,099	162.79
Ridgeview irrigation district.....	6,159	5,909	5,909	434,384	73.51
Slide irrigation district.....	1,144	1,103	1,103	119,707	108.53
Special and Warren Act contractors..	13,800	12,860	12,860	1,718,513	133.63
Total, Owyhee project.....	118,922	111,098	111,498	10,116,222	90.73
<i>Washington</i>					
Columbia Basin: East Columbia Basin irrigation dis- trict.....	60,777	27,358	28,113	4,683,157	166.58
Quincy-Columbia Basin irrigation district.....	58,833	29,762	29,777	3,054,125	122.72
South Columbia Basin irrigation dis- trict.....	12,373	6,838	7,402	712,349	96.24
Total, Columbia Basin project.....	131,983	63,958	65,292	9,049,631	138.60
Okanogan.....	5,346	3,619	3,894	1,417,087	363.92
Yakima: Kennewick division.....	4,637	2,679	2,882	668,942	232.11
Kittitas division.....	59,610	54,761	54,993	2,382,784	43.33
Roza division.....	72,185	63,381	63,381	10,667,929	168.31
Sunnyside division.....	103,579	79,853	80,762	15,033,704	186.15
Tieton division.....	27,271	24,405	24,599	16,907,318	687.32
Special and Warren Act contractors..	181,761	160,693	160,693	31,826,852	198.06
Total, Yakima project.....	449,043	385,772	387,310	77,487,529	200.07
Total, region 1.....	2,385,234	2,113,418	2,117,698	221,487,324	104.59
REGION 2					
<i>California</i>					
Central Valley <sup>a</sup> .....	838,907	611,054	634,103	136,299,346	214.95
Orland.....	19,431	17,261	17,261	1,600,864	92.72
<i>Oregon-California</i>					
Klamath: Main division (Oregon).....	39,364	34,731	35,213	3,346,421	95.03
Tule Lake division (California).....	44,430	43,393	43,393	6,221,900	143.38
Special and Warren Act contractors..	92,386	85,989	86,123	7,107,727	82.53
Leased and water rental lands.....	71,923	32,372	32,372	2,686,564	82.99
Total, Klamath project.....	248,103	196,485	197,101	19,362,612	98.24
Total, region 2.....	1,106,441	824,800	848,465	157,262,822	185.35



TABLE 5.—*Projects in operation—irrigation and crop value data for the calendar year 1953—Continued*

State, project, and subdivision	Special and Warren Act contractors receiving water from Bureau-constructed works				Leased and water rental lands receiving water from Bureau-constructed works				Entire area receiving full or supplemental water from Bureau-constructed works						
	Irrigable area for service 1	Irrigated area	Net area in cultivation	Gross crop value	Irrigable area for service 1	Irrigated area	Net area in cultivation	Gross crop value	Irrigable area for service 1	Irrigated area	Net area in cultivation	Gross crop value			
												Total	Per acre	Total	Per acre
<b>REGION 3</b>															
<i>Arizona</i>															
<b>Gila:</b>															
Wellton-Mohawk division									Acres	Acres	Acres		\$5,442,311	\$243.00	
Yuma Mesa division:															
North Gila unit	984	830	830	\$112,729					7,215	6,887	6,887		1,853,434	269.12	
South Gila unit	785	785	785	133,167					785	785	785		133,167	169.64	
Yuma Mesa unit									20,251	13,920	13,923		1,616,683	116.07	
Total, Gila project	1,769	1,615	1,615	245,896					51,001	43,988	43,991		9,044,945	206.51	
Salt River	96,755	79,375	79,375	22,374,339					337,077	292,240	306,047		79,875,616	260.99	
Yuma Auxiliary									3,384	2,112	2,112		561,166	263.70	
<i>Arizona-California</i>															
<b>Yuma:</b>															
Reservation division:															
Bard unit (California)				6,896									6,467	1,114,488	172.33
Indian lands (California)				7,743									5,388	1,185,881	220.10
Valley division (Arizona)				51,936									47,118	16,251,412	344.91
Total, Yuma project				66,575									58,973	18,551,781	314.58
<i>California</i>															
<b>Boulder Canyon:</b>															
Coachella division															
Imperial division 1	530,000	430,000	445,000	85,543,780									47,370	14,363,118	303.21
Total, Boulder Canyon project	530,000	430,000	445,000	85,543,780									47,370	14,363,118	303.21
Total, region 3	627,524	510,990	525,990	108,104,015					1,068,237	874,710	903,493		207,940,406	230.15	
<b>REGION 4</b>															
<i>Colorado</i>															
<b>Fruitgrowers Dam 2</b>													2,678	178,483	85.89

Grand Valley: Garfield Gravity division.....																1,809,220		84.02
Orcutt Mesa division 3.....																1,707,013		210.43
Special and Warren Act contractors.....	9,045	7,675	2,049,825	267.08												2,049,825		267.08
Total, Grand Valley project.....	9,045	7,675	2,049,825	267.08												5,566,058		149.15
<i>Idaho</i>																		
Mancos 4.....																7,588		27.69
Paonia 3.....																9,070		62.66
Pine River.....																34,660		22.68
Pine River Indian Irrigation.....																9,780		22.84
Uncompahgre.....	16,176	15,818	550,024	34.48												74,633		58.82
Preston Bench 3.....																4,181		89.36
<i>Nevada</i>																		
Humboldt.....																29,363		66.08
<i>Newlands:</i>																		
North Carson division.....																4,416		49.93
South Carson division.....																44,471		40.97
Truckee division.....																5,241		42.84
Total, Newlands project.....																54,128		41.88
<i>Nevada-California</i>																		
Truckee Storage.....																22,986		70.86
<i>Utah</i>																		
Hyrum.....																5,684		60.02
Moon Lake.....																58,796		17.22
Newton 4.....																1,918		64.78
Ogden River.....																16,266		103.95
Provo River: Deer Creek division.....																40,488		86.54
Sanpete: Ephraim division.....																7,133		41.43
Spring City division.....																5,778		46.79
Totals, Sanpete project.....																12,911		43.83
Scofield 4.....																15,009		55.09
Strawberry Valley: Highline division.....																15,984		52.16
Spanish Fork division.....	3,726	3,585	279,787	77.14												17,028		75.57
Springville-Mapleton division.....																8,200		75.44
Total, Strawberry Valley project.....	3,726	3,585	279,787	77.14												41,475		66.39
Weber River.....																90,914		101.52
Total, region 4.....	28,947	27,078	2,879,636	105.65												569,247		67.06

See footnotes at end of table.









SUMMARY

	Irrigable area for service <sup>1</sup>	Irrigated area	Net area in cultivation	Gross crop value	Value per acre
Full supply projects.....	<i>Acres</i> 2,852,697	<i>Acres</i> 2,470,684	<i>Acres</i> 2,517,517	\$312,279,056	\$124.04
Supplemental supply projects.....	1,254,423	1,148,957	1,158,695	96,788,085	83.53
Special and Warren Act contractors.....	2,792,617	2,869,397	2,407,453	368,149,105	152.92
Additional areas reported:					
Temporarily suspended lands.....	137,975	41,311	41,311	2,922,927	70.75
Leased and water rental lands.....	109,816	67,266	67,440	5,800,695	86.01
Grand totals.....	7,147,528	6,097,615	6,192,416	785,939,868	126.92
Grand total, 1952.....	6,994,478	5,955,750	6,026,354	935,679,755	155.26
Increase or decrease, 1952-53 total.....	+153,050	+141,865	+166,062	-149,739,887	-28.34

<sup>1</sup> Area for which Bureau is prepared to supply water.  
<sup>2</sup> Generally part of irrigable area for service but not subject to construction charges until reclaimed.  
<sup>3</sup> Private project reconstructed or rehabilitated with Government funds.  
<sup>4</sup> Water conservation and utilization project.  
<sup>5</sup> Special contract.  
<sup>6</sup> Of this irrigable area for service, 929 acres are in California and 38,435 acres are in Oregon.  
<sup>7</sup> Of this irrigable area for service, 42,841 acres are in California and 2,089 acres are in Oregon.  
<sup>8</sup> Special contract. Bureau constructed dam and canal carriage system. Distribution system and power plants on the All-American Canal were built by Imperial irrigation district. Prior to construction of All-American Canal, district lands were irrigated with Colorado River water from a district-constructed system.  
<sup>9</sup> Although there are 178,102 acres that can be irrigated within project limits, the area for which there is considered to be a safe and reliable water supply is 153,000 acres, 88,000 in the Elephant Butte district and 67,000 in the El Paso district.  
<sup>10</sup> Of this irrigable area for service, 100,949 acres are in Nebraska and 1,875 acres are in Wyoming.  
<sup>11</sup> Of this irrigable area for service, 92,398 acres are in Nebraska and 16,317 acres are in Wyoming.  
<sup>12</sup> Of this irrigable area for service, 13,634 acres are in Nebraska and 8,732 acres are in Wyoming.

NOTE.—Per acre value based on net area in cultivation.



TABLE 6.—Cumulative crop values—1906-53

Year	Federal irrigation projects <sup>1</sup>				Warren Act lands and special contractors				Entire area			
	Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	39,300	2,22,300	\$5,005,360	271,609,071	501,100	4,811,000	\$83,000,000	39,300	2,22,300	2,22,300	\$5,005,360	
1907	266,300	2,169,000	4,760,460	66,821,396	951,987	8,000,613	64,004,750	266,300	2,169,000	2,435,300	\$9,005,360	
1908	488,942	2,859,549	7,920,663	88,974,137	1,011,815	9,016,313	80,000,000	488,942	2,859,549	2,859,549	\$13,641,248	
1909	730,601	4,100,628	12,601,948	1,183,292	981,940	10,000,000	88,974,137	730,601	4,100,628	4,100,628	\$17,920,663	
1910	917,751	4,733,423	17,974,639	1,461,704	1,146,810	11,146,810	981,940	917,751	4,733,423	4,733,423	\$22,536,550	
1911	1,042,609	5,643,681	21,224,224	1,637,142	1,231,400	12,378,214	1,146,810	1,042,609	5,643,681	13,121,224	\$30,657,774	
1912	1,205,236	6,180,680	24,470,368	1,809,357	1,343,400	13,721,614	1,231,400	1,205,236	6,180,680	14,739,368	\$40,537,142	
1913	1,255,381	6,991,383	26,732,215	2,039,357	1,457,517	15,179,131	1,343,400	1,255,381	6,991,383	16,478,215	\$50,869,357	
1914	1,240,875	7,661,771	28,014,452	2,281,326	1,569,521	16,748,652	1,457,517	1,240,875	7,661,771	18,146,452	\$61,341,874	
1915	1,472,772	8,567,613	30,326,298	2,518,652	1,684,316	18,432,968	1,569,521	1,472,772	8,567,613	20,014,452	\$73,478,215	
1916	1,509,521	9,067,784	32,835,972	2,704,787,611	1,801,100	19,234,068	1,684,316	1,509,521	9,067,784	21,882,298	\$85,509,326	
1917	1,732,374	1,051,183	36,462,313	2,918,611	2,011,815	21,245,883	1,801,100	1,509,521	9,067,784	23,749,811	\$97,481,111	
1918	1,651,159	1,113,469	38,974,137	3,107,437	2,118,115	23,363,998	2,011,815	1,651,159	1,113,469	25,663,280	\$109,590,326	
1919	1,651,960	1,153,820	40,620,300	3,290,811	2,218,292	25,582,290	2,118,115	1,651,960	1,153,820	27,577,111	\$122,118,531	
1920	1,674,100	1,227,500	42,470,300	3,470,300	2,318,292	27,896,582	2,218,292	1,674,100	1,227,500	29,499,611	\$135,118,531	
1921	1,692,700	1,300,100	44,370,300	3,650,300	2,418,292	30,314,874	2,318,292	1,692,700	1,300,100	31,429,711	\$148,118,531	
1922	1,718,400	1,370,000	46,320,300	3,830,300	2,518,292	32,833,166	2,418,292	1,718,400	1,370,000	33,459,711	\$161,118,531	
1923	1,805,750	1,440,000	48,320,300	4,010,300	2,618,292	35,451,458	2,518,292	1,805,750	1,440,000	35,489,711	\$174,118,531	
1924	1,802,970	1,510,000	50,320,300	4,190,300	2,718,292	38,169,750	2,618,292	1,802,970	1,510,000	37,519,711	\$187,118,531	
1925	1,844,550	1,580,000	52,320,300	4,370,300	2,818,292	40,988,042	2,718,292	1,844,550	1,580,000	39,549,711	\$200,118,531	
1926	1,882,930	1,650,000	54,320,300	4,550,300	2,918,292	43,906,334	2,818,292	1,882,930	1,650,000	41,579,711	\$213,118,531	
1927	1,922,330	1,720,000	56,320,300	4,730,300	3,018,292	46,924,626	2,918,292	1,922,330	1,720,000	43,609,711	\$226,118,531	
1928	1,963,930	1,790,000	58,320,300	4,910,300	3,118,292	50,042,918	3,018,292	1,963,930	1,790,000	45,639,711	\$239,118,531	
1929	2,005,530	1,860,000	60,320,300	5,090,300	3,218,292	53,261,210	3,118,292	2,005,530	1,860,000	47,669,711	\$252,118,531	
1930	2,047,130	1,930,000	62,320,300	5,270,300	3,318,292	56,580,502	3,218,292	2,047,130	1,930,000	49,699,711	\$265,118,531	
1931	2,088,730	2,000,000	64,320,300	5,450,300	3,418,292	60,000,794	3,318,292	2,088,730	2,000,000	51,729,711	\$278,118,531	
1932	2,130,330	2,070,000	66,320,300	5,630,300	3,518,292	63,521,086	3,418,292	2,130,330	2,070,000	53,759,711	\$291,118,531	
1933	2,171,930	2,140,000	68,320,300	5,810,300	3,618,292	67,143,378	3,518,292	2,171,930	2,140,000	55,789,711	\$304,118,531	
1934	2,213,530	2,210,000	70,320,300	6,000,300	3,718,292	70,865,670	3,618,292	2,213,530	2,210,000	57,819,711	\$317,118,531	
1935	2,255,130	2,280,000	72,320,300	6,190,300	3,818,292	74,687,962	3,718,292	2,255,130	2,280,000	59,849,711	\$330,118,531	
1936	2,296,730	2,350,000	74,320,300	6,380,300	3,918,292	78,610,254	3,818,292	2,296,730	2,350,000	61,879,711	\$343,118,531	
1937	2,338,330	2,420,000	76,320,300	6,570,300	4,018,292	82,632,546	3,918,292	2,338,330	2,420,000	63,909,711	\$356,118,531	
1938	2,379,930	2,490,000	78,320,300	6,760,300	4,118,292	86,754,838	4,018,292	2,379,930	2,490,000	65,939,711	\$369,118,531	
1939	2,421,530	2,560,000	80,320,300	6,950,300	4,218,292	90,977,130	4,118,292	2,421,530	2,560,000	67,969,711	\$382,118,531	
1940	2,463,130	2,630,000	82,320,300	7,140,300	4,318,292	95,300,422	4,218,292	2,463,130	2,630,000	69,999,711	\$395,118,531	
1941	2,504,730	2,700,000	84,320,300	7,330,300	4,418,292	99,722,714	4,318,292	2,504,730	2,700,000	72,029,711	\$408,118,531	
1942	2,546,330	2,770,000	86,320,300	7,520,300	4,518,292	104,245,006	4,418,292	2,546,330	2,770,000	74,059,711	\$421,118,531	
1943	2,587,930	2,840,000	88,320,300	7,710,300	4,618,292	108,867,298	4,518,292	2,587,930	2,840,000	76,089,711	\$434,118,531	
1944	2,629,530	2,910,000	90,320,300	7,900,300	4,718,292	113,589,590	4,618,292	2,629,530	2,910,000	78,119,711	\$447,118,531	
1945	2,671,130	2,980,000	92,320,300	8,090,300	4,818,292	118,411,882	4,718,292	2,671,130	2,980,000	80,149,711	\$460,118,531	

1946	3, 079, 761	2, 513, 687	2, 567, 050	279, 711, 300	2, 981, 229, 632	2, 071, 070	1, 808, 282	1, 829, 531	1, 250, 912	645	1, 995, 967, 011	5, 150, 831	4, 321, 969	4, 396, 581	530, 623, 945	4, 977, 196, 643
1947	3, 091, 977	2, 629, 727	2, 683, 253	300, 474, 560	3, 281, 704, 192	2, 074, 806	1, 891, 975	1, 871, 099	254, 946	244	2, 250, 913, 253	5, 166, 783	4, 461, 702	4, 534, 352	555, 420, 804	5, 532, 617, 447
1948	3, 221, 464	2, 654, 619	2, 760, 493	277, 160, 874	3, 558, 865, 096	2, 158, 551	1, 894, 136	1, 939, 241	257, 462	667	2, 508, 375, 922	5, 380, 015	4, 588, 755	4, 699, 734	534, 623, 541	6, 007, 240, 988
1949	3, 296, 297	2, 792, 108	2, 848, 896	277, 347, 763	3, 836, 212, 829	2, 382, 215	2, 028, 481	2, 067, 338	238, 981	245	2, 747, 357, 167	5, 678, 512	4, 820, 589	4, 916, 234	516, 329, 008	6, 583, 569, 996
1950	3, 398, 168	2, 857, 533	2, 918, 105	287, 683, 368	4, 123, 896, 197	2, 626, 342	2, 219, 653	2, 271, 358	290, 554	341	3, 037, 911, 508	6, 024, 510	5, 077, 186	5, 189, 463	578, 237, 097	7, 161, 807, 705
1951	4, 049, 409	3, 856, 094	3, 624, 299	445, 407, 191	4, 569, 303, 388	2, 663, 606	2, 279, 675	2, 317, 714	376, 314	474	3, 414, 225, 982	6, 713, 015	5, 875, 769	5, 942, 013	821, 721, 665	7, 983, 529, 370
1952	4, 264, 906	3, 643, 544	3, 681, 216	504, 544, 596	5, 073, 847, 984	2, 729, 572	2, 312, 206	2, 345, 138	431, 135, 159	3, 845, 361, 141	6, 994, 478	5, 955, 750	5, 955, 750	6, 026, 354	935, 679, 755	8, 919, 209, 125
1953	4, 354, 911	3, 728, 218	3, 784, 963	417, 790, 763	5, 491, 638, 747	2, 792, 617	2, 369, 397	2, 407, 453	368, 149, 105	4, 213, 510, 246	7, 147, 528	6, 097, 615	6, 097, 615	6, 192, 416	785, 939, 868	9, 705, 148, 993

1 Includes projects constructed by the United States and those for which supplemental water is furnished from storage works built by the United States.

2 Estimated.

Highlights of achievements in several regions include the following:

In the Northwest the area in cultivation increased 53,170 acres with the principal increase taking place on the Columbia Basin project, Washington. Per acre yields were comparable to those obtained in 1952 when the highest total value harvest was achieved. However, a dip in the general level of prices received by farmers for crops contributed to a decline in total crop value.

The relatively high average value per acre of crops in region 2 (\$185) and region 3 (\$230) reflects the production of high value crops such as vegetables, truck, fruit, and cotton on a relatively large percentage of the area and the multiple cropping of a considerable acreage. The irrigable area for service was increased 55,729 acres in region 2 and 31,256 acres in region 3. Approximately one-half of the 31,000-acre lettuce crop of the Imperial division of the Boulder Canyon project was processed for shipment in recently constructed vacuum cooling plants in the valley, which reduce the temperature of the lettuce to 33° in about 20 minutes.

Many of the projects of region 4 are characterized by high elevations and mountain valleys with a relatively short growing season, and are subject to late spring and early fall frosts. Fruit production declined from the 1952 level on six projects by reason of late spring frosts.

All projects in region 5, except Fort Sumner, N. Mex., reported a shortage of water for the 1953 season.

Projects in region 6 are primarily producers of cereals and forage crops utilized as livestock feed. Approximately 85 percent of the irrigated area is used for these crops. Growing conditions were favorable on all projects except Belle Fourche which experienced frost late in the spring and hail in July.

In region 7, the Frenchman-Cambridge division of the Missouri River Basin project was prepared to serve 11,500 new acres for the first time in 1953. The Colorado Big-Thompson project works delivered approximately 177,594 acre-feet of water to the Northern Colorado Water Conservancy District as compared with 41,141 acre-feet delivered in 1952.

### *Land Openings*

During the fiscal year 1954, 9 land openings conducted by the Bureau on 4 reclamation projects opened for settlement 389 new farm units totaling 34,126 acres.

The greatest number of the foregoing were on the Columbia Basin project where 256 units were offered for sale under the provisions of



the Columbia Basin Project Act. These included 15 part-time and 32 full-time farm units in the East Columbia Basin Irrigation District, 6 part-time and 30 full-time farm units in the Quincy-Columbia Basin Irrigation District, and 173 full-time farm units in the South Columbia Basin Irrigation District. Similarly, 28 farm units were offered for sale in the Wellton-Mohawk division of the Gila project under provisions of that project's authorization act. The remaining 105 farm units, opened for settlement under the provisions of reclamation and homestead laws, consisted of 85 farm units in the North Side pumping unit of the Minidoka project and 20 farm units in the Coachella division of the All-American Canal system, Boulder Canyon project.

The number of part-time farm units made available was 60 percent less than the average of the preceding 3 years. Settlement opportunities, however, were considerably enhanced over those of the preceding year by virtue of a 75-percent increase in the availability of full-time farm units. Despite this increase in the number of farm units offered for settlement, the demand by qualified applicants still continued to far exceed the available supply with an overall average of 71 applicants for each farm unit opened for sale or homesteading. Enactment of legislation (Public Law 402, 83d Cong., 2d sess.) extending present veterans' preference in land openings to veterans of the Korean conflict will in all probability result in a still further increase in the ratio between applicants and available farm units.

Since the close of World War II a total of 152,622 acres of land comprising 1,838 farm units on 13 reclamation projects have been opened to settlement. That these settlers have been eminently successful is evidenced by the extremely small response to date to the provisions of the act of August 13, 1953 (67 Stat. 566), providing for the exchange of farm units, on Federal irrigation projects, which prove insufficient to support a family.

Cooperative working relationships established by the Bureau with the Farmers Home Administration, the Agricultural Extension Service, the several State colleges and universities and comparable agencies, have been maintained. Additional agreements were consummated throughout the year whenever possible in the interest of project entrymen and their successful solution of farm unit development and management problems.

During the fiscal year 1955 it is anticipated that additional farm units will be made available to settlers. These land openings will be conducted on the Columbia Basin and Yakima projects, Washington; the Minidoka project, Idaho; and the Gila project, Arizona. A few additional farm units may be available on one or more of the other Bureau projects.

### *Development Farms*

The development farm program begun in 1947 has been continued in cooperation with several Department of Agriculture agencies and State agricultural colleges. From 10 to 20 percent of each farm is set aside for use by the cooperating agencies for conducting research in water use, fertilizers, crop diseases and other special problems peculiar to the area in question.

The remainder of the farm is used to demonstrate research findings as well as the most effective methods of irrigation, water requirements of crops, cropping practices, crops best adapted to the area, farm layout systems and other agricultural practices of which the new settlers may have had little or no experience. The farms are aiding also in determining the feasibility of developing certain areas for irrigation where the soil and water quality are such that sustained irrigation may be questionable.

The information obtained through the development farm program is disseminated jointly by the Bureau and the cooperating agencies by means of field days, tours, and other educational media. The program has aided the new settlers materially in making the early success of their irrigated farms and has helped to safeguard the Government's investment.

To date 22 development farms have been established of which four have served their purpose and have been discontinued. The farms are located in the Columbia Basin project, Washington; Missouri River Basin project, North Dakota, South Dakota, Kansas, and Nebraska; and Gila project, Arizona.

During consideration of the fiscal year 1955 Interior appropriation bill, the Congress directed that a review of the development farm program be made by the Departments of Agriculture and Interior and the Bureau of the Budget. Based on this review recommendations covering future operations are to be submitted to the 84th Congress.

### *Repayment and Water Service Contracts*

During fiscal year 1954, repayment contracts were entered into with 10 irrigation districts to assure the return of the cost of construction of new irrigation works and for municipal water service. In addition delivery of water to over 67 contracting organizations was provided for by interim and long-term water service type contracts executed during the year with irrigation districts and municipalities. Contracts providing for reimbursement of emergency and rehabilitation and betterment funds, or for adjustment of other contract provisions, were executed with 20 organizations. During fiscal year 1954, amenda-

tory basic construction repayment contracts were negotiated with 8 irrigation districts on 7 Federal reclamation projects involving the repayment of some \$45 million. Special legislation authorizing these contracts either was enacted during the year or was under consideration by the Congress at the close of the fiscal year. Negotiations of similar amendatory repayment contracts which must be submitted to the Congress are under way or are scheduled with additional irrigation districts involving construction costs approximating \$50 million.

### *Soil and Moisture Conservation Operations*

In keeping with the Department's policy of conservation of natural resources the Bureau has continued its soil and moisture conservation operations on lands under its jurisdiction. These activities have included erosion control on public lands, protection of reservoirs, canals and other irrigation works from siltation, and prevention of water losses detrimental to irrigation projects.

The program objectives are accomplished in cooperation with other Federal agencies as well as State and local agencies. Water users' organizations also assist in planning the work and in many cases furnish a part of the labor, materials, and funds. The work performed under this program is resulting in valuable assistance in protecting and improving the lands administered by the Bureau.

Some of the particular work items undertaken during the year included reseeding watershed areas, erosion control and soil stabilization, sand dune control, salt cedar control investigations, and protection of numerous irrigation facilities in the 17 Western States.

### *Drainage*

Drainage investigations were conducted primarily on projects which have been in operation for several seasons. The operation of the projects aid materially in the determination of the drainage facilities required.

The construction of drainage facilities is in numerous instances financed by the water users with technical assistance from the Bureau of Reclamation. However, where the requirement of drainage facilities can be determined during the construction period of a project, the financing of the work is handled by the Bureau of Reclamation as part of the construction cost.

The investigation program has been performed in numerous instances with the cooperation of the Geological Survey and agencies of the Department of Agriculture.



### *Weed Control*

The comprehensive program of weed control has been continued to further reduce the problems and costs caused by weeds on the banks and in the channels of distribution and drainage systems.

More effective and economical methods for controlling weeds have been developed through research conducted in cooperation with the Weed Investigation Section, Department of Agriculture, at four field stations and the Denver laboratory. In Denver special attention has been given to developing methods for controlling salt cedar, submersed waterweeds, and algae because of the special problems they create in connection with irrigation projects. The use of radioactive isotopes in tracing movement and concentration of herbicides in plant tissues also has been continued in Denver.

The application of methods thus developed together with the use of more efficient equipment for applying herbicides have materially reduced water losses and maintenance costs and have increased operation efficiency.

Federal and private irrigation projects are kept abreast of new developments in weed control through the use of motion pictures, slide lectures, Reclamation Era articles, handbooks and other educational media prepared by the Bureau. A second edition of the handbook on equipment used for weed control on irrigation systems was prepared and distributed during the year.

### *Cooperation With Other Agencies*

As in the past, the Bureau has worked closely with agencies in the Department of Agriculture, the State colleges and extension services, and other Federal, State, and local agencies. The cooperative undertakings with these agencies have been initiated and carried out through memoranda of understanding or cooperative agreements. As a result of this work the Bureau and the settlers on irrigation projects have obtained much valuable assistance and information. During the year 141 agreements were in effect, of which 46 were executed during the fiscal year.

### *Public Use of Reservoirs*

Construction of dams and reservoirs for irrigation and power development provides incidental but very definite benefits through the creation of exceptional public use opportunities. This is particularly true in the more arid parts of the West.

Except in the Missouri River Basin, the Bureau of Reclamation is not authorized to expend funds for development of reservoir areas

for public uses. At certain reservoirs where possibilities for use by the public are deemed to be of national significance, such as Lake Mead, on the Colorado River between Arizona and Nevada; Franklin D. Roosevelt Lake, on the Columbia River in Washington; Millerton Lake on the San Joaquin River in California; and Shadow Mountain Lake, and Lake Granby on the Colorado River in Colorado; responsibility for the development and administration of such facilities has been delegated to the National Park Service. The National Park Service is, in effect, the agent of the Bureau in public use matters and negotiates for the development and administration, by local or State governmental agencies, of reservoir areas which are of local or State significance. At certain reservoirs located within the national forest boundaries, facilities are administered by the United States Forest Service.

### *Federal Tax Revenues and Reclamation*

Each step taken in the development of the Nation's basic resources moves the economy of the Nation to a new and higher plateau. This is strikingly demonstrated in an analysis of Federal tax revenues from Federal reclamation project areas. Based on the projected results of a sample study of 15 reclamation projects, the estimated cumulative return to the Treasury from the 69 projects or divisions of projects receiving water under the Federal reclamation program in 1953 now stands at well over \$3.1 billion. This is an amount greater than total reclamation expenditure for all project works since the beginning of the Federal reclamation program in 1902.

The benefits accruing to the Nation through reclamation development are also measured in terms of families served, crop production and value, livestock raised, and acres irrigated. They are expressed in rapidly expanding trade and business activity, in direct repayment to the Government by the beneficiaries of reclamation, in increased population on and adjacent to projects, and in a wide variety of other phenomena. These are all tangible, measurable benefits of a broad and lasting nature. They translate into expanding business activities in the project and surrounding areas. They filter to every State in the Union and every segment of society. They provide through this process additional economic stability to the Nation which is reflected in part by increased revenues to the Treasury in the faraway States and areas as well as on the projects themselves.

The estimate of Federal tax revenues from reclamation project areas is, therefore, only a partial measure of the true contribution of basic reclamation resource development to the Nation's tax structure and to the economy as a whole.

In 1953 individual income taxes paid directly by irrigation farmers and by persons of the neighboring towns and villages whose business or employment was affected by the construction of 15 selected reclamation projects were estimated at \$106 million. The aggregate individual income tax revenues from this sample study area since income tax collections started in 1916 is estimated at over \$800 million.

In addition to individual tax revenues, an appropriate share of corporation and excise tax revenues collected in the same 15 project areas is directly attributable to reclamation development. Estimated receipts from these sources total nearly \$500 million. The combined returns from individual and corporate tax revenues accordingly are estimated at \$1.3 billion. Total Federal project construction cost through June 30, 1953, for the same projects aggregated \$269 million. Thus far, Federal taxes collected have exceeded the Federal investment in irrigation features in these projects by about five times.

## POWER DIVISION

Installation and production of hydroelectric powerplant capacity increased on the multipurpose projects of the Bureau of Reclamation during fiscal year 1954. On June 30, 1954, the total installed capacity in powerplants constructed and operated by the Bureau of Reclamation was 4,718,450 kilowatts. The increased capacity of 297,250 kilowatts, together with existing facilities, served market areas in the Western United States with electric energy for industrial and domestic purposes.

### *Present Installed Capacity*

During the fiscal year ending June 30, 1954, the Bureau had 29 powerplants with a total nameplate capacity of 4,718,450 kilowatts, an increase of 297,250 kilowatts capacity over the fiscal year 1953 figures. The capacity installed during fiscal year 1954 is as follows:

	<i>Kilowatts</i>
Colorado-Big Thompson project.....	104, 750
Hungry Horse project .....	142, 500
Missouri River Basin project.....	50, 000
	<hr/>
Total.....	297, 250

Powerplants operated by other agencies, principally water users' organizations on reclamation projects, totaled 15, of which 9 were originally constructed by the Bureau. These 9 plants have an installed nameplate capacity of 30,827 kilowatts; the 6 other plants constructed by the water users' organizations have an installed nameplate capacity of 82,500 kilowatts.



### *Additional Capacity Under Construction*

At the end of fiscal year 1954, the Bureau of Reclamation had under construction 6 powerplants, which will have an ultimate installed nameplate capacity of 367,500 kilowatts.

The United States Army Corps of Engineers is proceeding with the construction of its plants on the Missouri River Basin project. The Bureau of Reclamation will be the marketing agent for energy generated by all plants constructed by the Corps on the Missouri River Basin project.

TABLE 7.—*Bureau of Reclamation power systems, power sales, and revenues, by projects, fiscal year ending June 30, 1954*<sup>1</sup>

Projects	Sales of electric energy, kilowatt-hours	Revenues from sales
Boise project.....	210, 558, 188	\$463, 144. 63
Columbia basin project <sup>2</sup> .....	14, 224, 917, 000	12, 545, 618. 82
Minidoka project.....	125, 539, 969	525, 166. 64
Yakima project.....	25, 809, 400	65, 758. 65
Hungry Horse project <sup>3</sup> .....	685, 023, 780	4, 300, 259. 52
Central Valley project.....	2, 530, 304, 113	9, 297, 970. 89
Boulder Canyon project.....	4, 239, 896, 592	9, 531, 689. 87
Parker-Davis project.....	1, 379, 428, 917	5, 385, 340. 62
Yuma project.....	6, 130, 614	24, 128. 38
Rio Grande project.....	134, 035, 528	914, 066. 00
Fort Peck project.....	541, 293, 924	2, 073, 739. 56
North Platte project.....	61, 292, 699	416, 991. 71
Missouri River Basin—western division, including power systems of Riverton, Shoshone, Colorado-Big Thompson, and Kendrick projects.....	809, 706, 031	4, 989, 102. 08
Missouri River Basin, eastern division.....	97, 426, 659	279, 282. 69
Total.....	25, 071, 363, 414	50, 812, 260. 06

<sup>1</sup> Does not include energy sales and revenues in transactions between Bureau projects.

<sup>2</sup> Totals include 13,828,539,367 kilowatt-hours delivered to Bonneville Power Administration for marketing and \$12,347,430 in payments by that agency, but do not include payments for river regulation benefits.

<sup>3</sup> Totals include 682,133,537 kilowatt-hours delivered to Bonneville Power Administration for marketing and \$4,286,210 in payments by that agency.

### *Authorized To Be Constructed*

Authorized to be constructed by the Bureau of Reclamation as of June 30, 1954, are 32 powerplants with an ultimate total nameplate capacity of 1,135,950 kilowatts.

The status of hydroelectric powerplants on reclamation projects is shown in table 8.

TABLE 8.—Hydroelectric plants on Reclamation projects—operating, under construction, or authorized as of June 30, 1954

## A. CONSTRUCTED AND OPERATED BY BUREAU OF RECLAMATION

State	Project	Name of plant	Calendar year of initial operation	Nameplate capacity		Number and nameplate capacity of generators	
				Existing (kilowatts)	Ultimate (kilowatts)	Existing (kilowatts)	Ultimate (kilowatts)
1. Arizona-Nevada	Boulder Canyon	Hoover 1	1936	1,249,800	1,354,300	14-82,500; 1-40,000; 2-2,400; 1-50,000.	14-82,500; 1-40,000; 1-50,000; 2-2,400; 1-104,500.
2. Arizona-Nevada	Davis Dam	Davis	1951	225,000	225,000	5-45,000.	5-45,000.
3. Arizona-Nevada	Parker	Parker	1942	120,000	120,000	4-30,000.	4-30,000.
4. California	Central Valley	Keswick	1949	75,000	75,000	3-25,000.	3-25,000.
5. California	Central Valley	Shasta	1944	379,000	379,000	5-75,000; 2-2,000.	5-75,000; 2-2,000.
6. California	Yuma	Siphon Drop	1926	1,600	1,600	2-800.	2-800.
7. Colorado	Colorado-Big Thompson	Estes	1950	45,000	45,000	3-15,000.	3-15,000.
8. Colorado	do	Flatiron	1954	71,500	71,500	2-31,500; 1-8,500.	2-31,500; 1-8,500.
9. Colorado	do	Green Mountain	1945	21,600	21,600	2-10,800.	2-10,800.
10. Colorado	do	Marys Lake	1951	8,100	8,100	1-8,100.	1-8,100.
11. Colorado	do	Polehill	1954	33,250	33,250	1-33,250.	1-33,250.
12. Idaho	Boise	Anderson Ranch	1950	27,000	27,000	2-13,500.	2-13,500.
13. Idaho	do	Black Canyon	1925	8,000	8,000	2-4,000.	2-4,000.
14. Idaho	do	do	1925	1,500	1,500	3-500.	3-500.
15. Idaho	do	Mimidoka	1912	13,400	13,400	1-5,000; 1-2,400; 5-1,200.	1-5,000; 1-2,400; 5-1,200.
16. Montana	Missouri River Basin	Canyon Ferry	1909	50,000	50,000	3-16,667.	3-16,667.
17. Montana	Hungry Horse	Hungry Horse	1953	285,000	285,000	4-71,250.	4-71,250.
18. New Mexico	Rio Grande	Elephant Butte	1940	24,300	24,300	3-8,100.	3-8,100.
19. South Dakota	Missouri River Basin	Angostura	1951	1,200	1,200	1-1,200.	1-1,200.
20. Washington	Columbia Basin	Grand Coulee 3 4	1941	1,974,000	1,974,000	18-108,000 4; 3-10,000.	18-108,000 4; 3-10,000.
21. Washington	Yakima	Prosper	1932	2,400	2,400	1-2,400.	1-2,400.
22. Wyoming	Kendrick	Seminoe	1939	32,400	32,400	3-10,800.	3-10,800.
23. Wyoming	Missouri River Basin	Boysen	1952	15,000	15,000	2-7,500.	2-7,500.
24. Wyoming	do	Kortez	1950	36,000	36,000	3-12,000.	3-12,000.
25. Wyoming	North Platte and Missouri River Basin.	Guernsey 5	1927	4,800	14,800	2-2,400.	2-2,400; 1-10,000.
26. Wyoming	River Basin.	Lingle	1919	1,400	1,400	2-400; 2-300.	2-400; 2-300.
27. Wyoming	North Platte	Pilot Butte	1925	1,600	1,600	2-800.	2-800.
28. Wyoming	Riverton	Heart Mountain	1948	5,000	5,000	1-5,000.	1-5,000.
29. Wyoming	Shoshone	Shoshone	1922	5,600	5,600	1-4,000; 2-800.	1-4,000; 2-800.
30. Wyoming	do	Shoshone	1922	5,600	5,600	1-4,000; 2-800.	1-4,000; 2-800.
Subtotal A				4,718,450	4,846,450		

B. CONSTRUCTED BY BUREAU OF RECLAMATION; OPERATED BY OTHERS

1. Arizona.....	Salt River.....	1913	850	2-425	2-425.
2. Arizona.....	do.....	1914	5, 100	3-700	1-3,000; 3-700.
3. Arizona.....	Roosevelt.....	1909	15, 400	5-1,080; 1-4,000; 1-6,000	5-1,080; 1-4,000; 1-6,000.
4. Arizona.....	South Consolidated <sup>6</sup>	1912	1, 600	2-800	2-800.
5. Colorado.....	Grand Valley (Pallissade)	1912	3, 000	2-1,500	2-1,500.
6. Nevada.....	Newlands.....	1911	1, 640	1-640; 2-500	1-640; 2-500.
7. Oregon.....	Deschutes.....	1946	1, 500	1-1,500	1-1,500.
8. Utah.....	Strawberry Valley.....	1908	1, 550	2-450; 1-250; 1-400	2-450; 1-250; 1-400.
9. Washington.....	Rocky Ford (now idle)	1916	187	1-187	1-187.
Subtotal B.....			30, 827		

C. CONSTRUCTED AND OPERATED BY WATER USERS ORGANIZATIONS

1. Arizona.....	Salt River.....	1919	600	1-600	1-600.
2. Arizona.....	do.....	1927	30, 000	3-10,000	3-10,000.
3. Arizona.....	Horse Mesa <sup>9</sup>	1926	7, 000	1-7,000	1-7,000.
4. Arizona.....	Mormon Flat <sup>9</sup>	1930	10, 400	1-10,400	1-10,400.
5. California.....	Drop Nos. 3 and 4 <sup>10</sup>	1941	34, 000	1-5,200; 3-9,600	1-5,200; 3-9,600.
6. Oregon.....	C Canal Drop <sup>11</sup>	1938	500	1-500	1-500.
Subtotal C.....			82, 500		

D. CONSTRUCTED AND OPERATED BY CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY; POWER MARKETED BY BUREAU OF RECLAMATION

1. Montana.....	Fort Peck.....	1943	85, 000	185, 000	2-35,000; 1-15,000	3-35,000; 2-40,000.
2. South Dakota.....	Missouri River Basin.....	1954	80, 000	320, 000	2-40,000	8-40,000.
Subtotal D.....			165, 000	505, 000		

E. UNDER CONSTRUCTION BY BUREAU OF RECLAMATION

1. Alaska.....	Eklitna.....	1954	0	30, 000	0	2-15, 000.
2. California.....	Central Valley.....	1955	0	162, 000	0	3-54, 000.
3. California.....	Folsom.....	1955	0	13, 500	0	2-6, 750.
4. Idaho.....	Pallissades.....	1957	0	114, 000	0	4-28, 500.
5. Washington.....	Yakima-Kennewick Divi- sion.....	1955	0	12, 000	0	2-6, 000.
6. Wyoming.....	Kendrick.....	1954	0	36, 000	0	2-18, 000.
Subtotal E.....			0	367, 500		

See footnotes at end of table.



TABLE 8.—Hydroelectric plants on Reclamation projects—operating, under construction, or authorized as of June 30, 1954—Continued  
 F. UNDER CONSTRUCTION BY CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY: POWER TO BE MARKETED BY BUREAU OF RECLAMATION

State	Project	Name of plant	Calendar year of initial operation	Nameplate capacity		Number and nameplate capacity of generators	
				Existing (kilowatts)	Ultimate (kilowatts)	Existing (kilowatts)	Ultimate (kilowatts)
1. North Dakota	Missouri River Basin	Garrison	1955	0	400,000	0	5-80,000.
2. South Dakota	do	Gavins Point	1956	0	100,000	0	3-33,333.
3. South Dakota	do	Oahe	1961	0	425,000	0	5-85,000.
	Subtotal F			0	925,000		

## G. AUTHORIZED TO BE CONSTRUCTED BY BUREAU OF RECLAMATION

	State	Project	Name of plant	Calendar year of initial operation	Nameplate capacity		Number and nameplate capacity of generators	
					Existing (kilowatts)	Ultimate (kilowatts)	Existing (kilowatts)	Ultimate (kilowatts)
1.	California	Central Valley	Trinity	1963	0	90,000	0	4-22,500.
	do	do	Leviston	1961	0	2,000	0	1-2,000.
3.	California	do	Tower House	1961	0	66,000	0	3-22,000.
4.	California	do	Matheson	1961	0	75,000	0	3-25,000.
5.	Colorado	Collbran	Molina	1959	0	5,500	0	1-5,500.
6.	Colorado	do	Cameo	1960	0	2,500	0	1-2,500.
7.	Colorado	Colorado-Big Thompson	Big Thompson	1958	0	4,500	0	1-4,500.
8.	Idaho	Minidoka	American Falls	1959	0	30,000	0	3-10,000.
9.	Montana	Missouri River Basin	Lyon	1963	0	24,000	0	3-8,000.
10.	Montana	do	Absaroka	1964	0	50,000	0	3-16,667.
11.	Montana	do	Portage	1963	0	20,000	0	2-10,000.
12.	Montana	do	Yellowtail	1960	0	200,000	0	4-50,000.
13.	Montana	do	Moorhead	1970	0	8,000	0	2-4,000.
14.	Montana	do	Reiche	1963	0	20,000	0	2-10,000.
15.	Montana	do	Little Porcupine	1970	0	18,000	0	2-10,000.
16.	Montana	do	Kenil	1963	0	1,600	0	3-6,000.
17.	Montana	do	Tiber	1958	0	2,000	0	2-800.
18.	Nebraska	do	Harlan	1963	0	1,200	0	3-667.
19.	Nebraska	do	Lincoln Valley	1963	0	50,000	0	1-1,200.
20.	North Dakota	do	Lonecree	1965	0	45,000	0	3-15,667.
21.	South Dakota	do	Pony Hills	1963	0	180,000	0	3-15,000.
22.	Utah	Weber Basin	Gateway	1957	0	4,000	0	4-45,000.
23.	Utah	do	Wanship	1957	0	1,400	0	2-1,700; 1-600.
24.	Utah	Provo River Basin	Deer Creek	1957	0	1,400	0	1-1,400.
25.	Washington	Yakima Roza Division	Roza	1958	0	5,000	0	2-2,500.
26.	Wyoming	Missouri River Basin	Bald Ridge	1963	0	11,250	0	2-5,625.
					0	30,000	0	3-10,000.

27. Wyoming.....do.....	1964	0	12,000	0	2-6,000.
28. Wyoming.....do.....	1964	0	20,000	0	2-10,000.
29. Wyoming.....do.....	1964	0	60,000	0	3-20,000.
30. Wyoming.....do.....	1961	0	24,000	0	2-12,000.
31. Wyoming.....do.....	1964	0	25,000	0	2-12,500.
32. Wyoming.....do.....	1961	0	48,000	0	2-24,000.
Subtotal G.....		0	1,135,950		

H. AUTHORIZED TO BE CONSTRUCTED BY CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY: POWER TO BE MARKETED BY BUREAU OF RECLAMATION

1. California.....	1964	0	54,000	0	3-18,000.
2. South Dakota.....		0	120,000	0	6-20,000.
Subtotal.....		0	174,000		
Total.....		4,996,777	8,067,227		

1 Powerplant units operated by power allottees under agency contract.  
 2 27,000 kilowatts authorized, space provided in plant for third unit.  
 3 Power marketed by Bonneville Power Administration.  
 4 Main units with a nameplate rating at 108,000 kilowatts have continuous operating capacity of 120,000 kilowatts.  
 5 Proposed 10,000 kilowatt addition would be a Missouri River Basin project feature. No schedule for initial operation available.  
 6 Powerplant constructed by Bureau of Reclamation with Salt River Valley Water Users' Association funds.

7 Unit No. 3 installed in Pacific Power & Light Co.'s Cove No. 2 plant.  
 8 3 plants: (a) Spanish Fork (tipper); (b) Spanish Fork (lower); (c) Payson.  
 9 Salt River Valley Water-Users' Association plant.  
 10 Imperial Irrigation district's plant.  
 11 Enterprise Irrigation district's plant.  
 12 Not definitely scheduled. Installed capacity and installation dates tentative pending completion of project planning studies.

*Transmission Lines*

On June 30, 1954, the Bureau of Reclamation's transmission system consisted of 8,745 circuit miles of line. During fiscal year 1954, 312 circuit miles of transmission lines were completed. These are shown in table 9:

TABLE 9.—*Transmission lines completed during fiscal year 1954*

Project and line	Voltage (kilovolts)	In service date	Circuit miles
Missouri River Basin project, Fort Randall powerplant to Oahe temporary substation.....	230	March 1954.....	137.97
Fort Randall powerplant to Fort Randall tap.....	115	June 1954.....	<sup>1</sup> 23.7
Oahe temporary substation to Midland.....	115	March 1954.....	57.6
Montana Dakota utility powerplant to Devaul substation.....	69	September 1954.....	40.66
Oahe temporary substation to Fort Thompson (Big Bend) <sup>2</sup> .....	230	( <sup>3</sup> )	51.77
Total.....			311.70

<sup>1</sup> 2 circuits for the total of 23.7 miles.

<sup>2</sup> Second circuit part of the Fort Randall powerplant to Oahe temporary substation double circuit line.

<sup>3</sup> Completed but not energized.

*Power contracts.*—During fiscal year 1954, 54 contracts for delivery of power were executed. Included among these are:

## Number of contracts:

- 11 with private utilities.
- 25 with REA cooperatives.
- 3 with municipalities.
- 2 with other Federal agencies.
- 3 with public power districts.
- 4 with State authorities.
- 6 miscellaneous type contracts.

A number of contracts executed were renewals of operating contracts or revisions of existing contracts resulting from changed operating conditions.

The Bureau continued its policy of contracting whenever possible with private utilities and cooperatives for wheeling power and energy over existing facilities. The Bureau also entered into several interchange agreements with its customers.

A summary by classification of customers served by Reclamation during 1954 is shown in table 10.

The Bureau at the end of fiscal year 1954 had 232 contracts under active negotiation. In this number are included 81 contracts with municipalities, 115 with REA cooperatives, 14 with private utilities, 1 with a public power district, 10 with other Federal agencies, 2 with State authorities, 1 with irrigation districts, and 8 miscellaneous type contracts. A number of these are to renew the existing contracts, or to revise contracts in existence due to changes in operating conditions.



TABLE 10.—*Summary of classification of customers for 12 months ending June 30, 1954*<sup>1</sup>

Type of customers	Number of customers	Sales of electric energy (kilowatt-hours)	Revenues from sales of electric energy
Privately owned utilities.....	31	4, 173, 030, 838	\$14, 229, 281. 86
Municipal utilities.....	34	1, 750, 354, 290	4, 379, 330. 57
State Government utilities.....	11	2, 420, 078, 312	7, 176, 864. 02
Cooperative utilities (Rural Electrification Administration projects).....	93	619, 133, 778	3, 776, 071. 47
Other Federal utilities ?.....	5	14, 595, 097, 286	16, 982, 269. 71
Residential and domestic.....	299	5, 103, 178	29, 536. 41
Rural (other than Rural Electrification Administration projects).....	7	220, 104	1, 649. 46
Commercial and industrial.....	24	83, 111, 513	435, 197. 16
Public authorities.....	67	702, 329, 159	2, 808, 140. 85
Interdepartmental.....	50	722, 904, 956	993, 918. 55
Total all customers.....	621	25, 071, 363, 414	50, 812, 260. 06

<sup>1</sup> Does not include energy sales and revenues in transactions between Bureau projects.

<sup>2</sup> Totals include 14,510,672,904 kilowatt-hours delivered to Bonneville Power Administration for marketing and \$16,633,640 in payments by that agency.

## PROJECT DEVELOPMENT DIVISION

The project development program provides for the investigation of plans for potential projects for the utilization of the water resources of the West for irrigation and for other purposes. In recent years, the Congress also has made small appropriations of funds to the Bureau of Reclamation for investigations in Alaska relating to the development of water resources as a basis for legislation, and for reports thereon to Congress.

### *Comprehensive River Basin Surveys*

During fiscal year 1954, the Bureau of Reclamation continued the Arkansas-White-Red River Basin investigations in cooperation with other interested Federal agencies under the field committee established by the Federal Inter-Agency River Basin Committee on June 12, 1950.

A report on the Washita River subbasin in Oklahoma and Texas was submitted to the Congress by the Secretary of the Interior with recommendations for construction of Foss and Fort Cobb Dams and Reservoirs on the Washita River in Oklahoma. The report was printed as House document 219, 83d Congress. A bill to authorize these reservoirs had passed the Senate at the end of the fiscal year.

Several other river basin surveys were in progress but none was completed in fiscal year 1954.

### *New Projects Authorized*

The Eklutna project, a power project in Alaska, was reauthorized by act of Congress approved August 13, 1953.

The Interior Department Appropriation Act, 1954, provided funds for emergency rehabilitation of the Avondale and Dalton Gardens projects which are two small private irrigation developments in Idaho.

### *Project Planning Reports and Authorizing Legislation*

At the end of the fiscal year separate bills to authorize the Secretary of the Interior to construct the Santa Margarita project on the Santa Margarita River in California had passed the House and Senate and had been referred to a conference committee.

Reports on the following projects were submitted to the Congress by the Secretary and printed as congressional documents :

- Canton project, Oklahoma, House document 445, 83d Congress.
- Chief Joseph Dam project, Washington ; Brewster Flat, Shoreline Pumping and Bridgeport Bar Divisions, House document 374, 83d Congress.
- Colorado River Storage project, and participating projects, Colorado, New Mexico, Utah, Wyoming and Arizona, House document 364, 83d Congress.

The following 11 participating projects were recommended in this report :

- Central Utah project, Initial Phase, Utah.
- Emery County project, Utah.
- Florida project, Colorado.
- Hammond project, New Mexico.
- La Barge project, Wyoming.
- Lyman project, Wyoming.
- Pine River project extension, Colorado-New Mexico.
- Paonia project, Colorado.
- Seedskadee project, Wyoming.
- Silt project, Colorado.
- Smith Fork project, Colorado.
- Rogue River Basin project, Oregon ; Talent division, House document 450, 83d Congress.
- Santa Maria project, California, House document 217, 83d Congress.

Bills to authorize all of these projects were introduced and hearings were held or were pending in both Houses on all but the bill for the Canton project. The Senate hearings on the Colorado River storage project were still in progress at the end of the fiscal year. The bills on Chief Joseph project and Santa Maria project, as well as a bill to authorize the Ainsworth, Lavaca Flats, Mirage Flats extension and O'Neill units, all in the Niobrara River Basin in Nebraska, as parts of the Missouri River Basin project, had passed the House.

Hearings were held in both Houses on a bill to authorize the Fryingpan-Arkansas project, Colorado, and hearings held in either House or Senate on bills to authorize Michaud Flats project, Idaho ; Haystack Regulating Reservoir, north unit, Deschutes project, Oregon ; and a permanent diversion for the Palo Verde irrigation district, California. Bills to authorize several other projects were introduced in the Con-

gress but no action had been taken on these bills at the end of the year.

Reports on the Glendo unit, Oregon Trail division, Missouri River Basin project, Wyoming, and the Southwest Contra Costa County water district system, California, were submitted to the Congress by the Secretary pursuant to provisions of recent Interior Department appropriation acts requesting these reports. Subsequently, the House Committee on Interior and Insular Affairs endorsed the plans for the Glendo unit as outlined in the report on that unit, and a joint resolution reauthorizing the Glendo unit was passed by the House.

Also, reports on the following projects were submitted to the Congress by the Secretary during the fiscal year but none of these reports included recommendations for authorization for construction:

Balmorhea project (enlargement), Texas.

Brownwood project, Texas.

Central Valley project (ultimate plan), California Sacramento River Division, Clikapudi unit.

Sequim project, Washington.

The report on the Deschutes project, north unit, Haystack Equalizing Reservoir, Oregon, was reviewed by the Bureau of the Budget, and the report on the Michaud Flats project, Idaho, was submitted to the President and were under review by the Bureau of the Budget at the end of the fiscal year. The report on the Haystack Equalizing Reservoir also was forwarded to the Congress along with the comments of the Secretary on the legislation to authorize its construction.

The reports on the San Luis Valley project, Colorado, Rio Grande and Weminuche Pass divisions, and a reconnaissance report on Susitna River Basin, Alaska, were submitted by the Secretary to the affected States and Federal agencies. Also, a joint Army-Interior report on the Middle Snake River and tributaries in Idaho and Oregon was submitted to the affected States and Federal agencies.

### *Definite Plan Reports*

Definite plan reports were prepared, reviewed, and approved for the following projects or units in fiscal year 1954:

Dalton Gardens project, Idaho.

Eden project, Wyoming (revised).

Middle Rio Grande project, New Mexico, general plan.

Missouri River Basin project:

Bluff Unit, Wyoming.

Charley Creek unit, Montana.<sup>1</sup>

Hanover unit, Wyoming.

Helena Valley unit, Montana.

Nickwall unit, Montana.

Oakes development tract, North Dakota.

Palisades project, Idaho.

<sup>1</sup> Project not approved for construction under present conditions.



### *Land Classification*

Irrigability classification of lands began with the passage of the Reclamation Act of 1902 and has continued to increase in importance as reclamation irrigation projects have grown in size, complexity, and cost. In 1924, the Second Deficiency Act (Fact Finders' Act) charged the Secretary of the Interior with the responsibility of having the lands on each new project and new division of a project classified with respect to their capacity, under a proper agricultural program, to support a farm family and pay water charges. The act further authorized the Secretary to set definite construction charges against the different classes of land for the purpose of equitably apportioning the total construction costs so that all lands may bear the burden of such costs according to their productive value.

To further assure that these responsibilities would be carried out, the Department of the Interior Appropriation Act for fiscal year ending June 30, 1953, contained the following provision:

\* \* \* That no part of this or any other appropriation shall be available for the initiation of construction under the terms of Reclamation law of any dam or reservoir or water supply, or any tunnel, canal, or conduit for water, or water distribution system related to such dam or reservoir until the Secretary shall certify to the Congress that an adequate soil survey and land classification has been made and that the lands to be irrigated are susceptible to the production of agricultural crops by means of irrigation.

The same provision was included in the appropriation act for the fiscal year ending June 30, 1954, with the following additional phrase added:

\* \* \* or that the successful irrigability of those lands and their susceptibility to sustained production of agricultural crops by means of irrigation has been demonstrated in practice.

The provision is interpreted as being a continuing one.

During fiscal year 1954 certifications were made for land-classification surveys completed on 10 projects, divisions, or units. These 10 land-classification surveys covered about 400,000 acres of land in 8 of the 17 Western States. About 225,000 acres of this land were found suitable for irrigation development but were not necessarily all included in plans for development.

### *River Compacts*

The Sabine River compact was ratified by the State of Louisiana (after previous ratification by the State of Texas and signature of the Federal representative). A bill granting the consent of Congress to this compact passed the United States Senate and was introduced into the House.

Preliminary drafts of a proposed Columbia River Basin compact

were reviewed and comments furnished through the Secretary of the Interior to the Federal representative.

Hydrologic services in connection with interstate compacts and international treaties were also rendered during the year. These services included advice to the Upper Colorado River Commission in connection with the activities of that group and collaboration with the engineering advisory committee to the Pecos River Commission in evaluating depletions due to salt cedar growth in the Alamogordo-Carlsbad reach of the river.

### *International Stream Investigations*

The Bureau of Reclamation was represented on international engineering boards and a special engineering committee of the United States section of the International Joint Commission and participated in continuing engineering studies for use of the Commission in its consideration of the Waterton-Belly and Souris-Red Rivers references of January 12, 1948, relating to the apportionment of the waters of those international streams between the United States and Canada.

### *Hydrology*

Progress was made on many fronts in basic hydrology dealing with sediment, flood control, water resources and forecasting.

Work on the compilation of water-use data throughout the western United States was continued as part of the authorized research program on water requirements for irrigation.

Continued progress was made in improving techniques for determination of flood potential resulting from snowmelt runoff. A study was prepared utilizing an actuarial approach, involving strictly economic considerations, for determination of spillway design.

Development was completed of a method of day-by-day forecasting of runoff from snowmelt in connection with multiple-purpose reservoir operation.

An interim report on Distributing Sediment in Reservoirs has been prepared and is in the process of duplication. Several new and more simplified procedures are presented therein.

Considerable work was done during the year in connection with the development of hydrologic studies for foreign projects such as those in Thailand, Malaya, Taiwan, and Iran.

### *Allocation of Costs*

A new procedure for the allocation of multiple-purpose project costs was put into effect in the 1954 fiscal year. The procedure was

jointly agreed upon and adopted for use by the Department of the Interior, the Department of the Army, and the Federal Power Commission. Under the new procedure a uniform method will be applied to all projects thus eliminating the unsatisfactory circumstance where the three Federal departments frequently arrive at three different answers to the same question.

## PROGRAM COORDINATION AND FINANCE DIVISION

### *The Accounting System*

A complete revision of the finance manual was started during fiscal year 1954 and is scheduled for completion in the early part of fiscal year 1955. The revision of the accounting system is aimed at streamlining of procedures, reduction of volume of accounting instructions and consolidation of related sections for ease of reference. Printing of the basic elements of the accounting system in a form comparable to those issued by regulating agencies such as the Federal Power Commission has been deferred until completion of the revision.

Internal operational surveys were conducted in certain offices and, as a result, through rearrangement of duties and functions and improvements in routine operations more efficient operations were effected.

A consolidated financial statement was prepared for the period ending June 30, 1953, which reflected the cumulative financial operations of the Bureau for the past 51 years. The report revealed that the Government's investment in physical plant was approximately \$2.5 billion, which is indicative of the Bureau's progress in reclaiming the water and land resources of the country for beneficial purposes. The report also reflected an increase of over \$60 million in contracts with water users for repayment of construction costs, and unmatured repayment contracts amounted to over \$580 million. In addition over \$363 million have been collected from sales of electric power.

### *Special Assignments*

Among the special assignments in which the Systems Section participated was that of resolving All-American Canal problems. Cost allocations of the All-American Canal, for use in repayment negotiations with water users and other interested parties, have been completed and discussions held with the parties concerned. Based on the cost allocation and other policy decisions the Secretary has determined the cost of the canal to each of the participants and issued notices of such determinations to the water users.



Numerous other special assignments were handled, among which was the participation in activities of the Reports Review Committee. As a result of the work of this committee, the reports and related paper work were reduced, resulting in increased economy and efficiency.

### *Schedules*

Integration of the estimating, programing, reporting, and accounting procedures was well established and in active use by the beginning of fiscal year 1954. As a result, it was possible during the year to maintain closer and more effective control of the Bureau's program in accordance with Presidential policies and criteria as well as congressional and budgetary limitations. The Bureau's excellent record in reduction of unobligated balances can, in part, be attributed to this control.

With emphasis on reduced appropriations, programs were constantly reexamined and analyzed and fund transfers effected to make the most efficient use of funds available. Closer attention was paid to the tie-in between apportionments and programs. As programs changed or funds were reallocated, program change orders and reapportionment schedules were required. When necessary, authority was obtained from the Department or the Bureau of the Budget to make changes in the program, and major program changes were brought to the attention of appropriate congressional committees. Programs and funds were under the almost constant scrutiny of the Bureau of the Budget. By maintaining up-to-date program and apportionment schedules, it was possible to answer many inquiries from that Bureau.

Particular attention was devoted during the year to the problem of reconciling acreage data reported in the various program documents with that shown in the annual crop report.

Major objectives in scheduling improvements for fiscal year 1955 include refinement of forms and procedures to reduce to a minimum manpower requirements and to comply with revisions in the Bureau's organization. Special attention will be given to operation and maintenance schedules where possibilities for simplification and more effective control appear most likely.

### *Budget*

Appropriations made available to the Bureau of Reclamation for fiscal year 1954 totaled \$143,669,660, exclusive of \$4,610,748 in permanent appropriations. This was a decrease of \$62,778,331 below appropriations for fiscal year 1953. With an unobligated balance of \$42,383,231 plus trust funds, working funds, and funds advanced by water users, the money available for reclamation was \$196.4 million. Of this amount, however, \$4,230,209 was placed in a budgetary reserve,

leaving a net amount programed of \$192.2 million. There were additional unobligated funds at the close of 1954 totaling \$7.2 million.

Obligations for fiscal year 1954 reached \$185.0 million or 96.3 percent of the obligations programed, as compared with 83.2 percent of the program accomplished in 1953.

The 1954 Appropriation Act, as in previous years, imposed certain restrictions upon the Bureau which added somewhat to its administrative problems. As in 1952 and 1953 the Bureau was again prohibited from initiating construction on transmission facilities in areas covered by power wheeling contracts unless the power companies in such areas were unable or unwilling to construct them. The limitation on the amount which may be used for the performance of work by Government forces (force account work) first imposed upon the Bureau in the 1949 Appropriation Act and repeated each year since was included again in the 1954 act. This limitation provided that not to exceed 12 percent of the allotment for any one project with a maximum of \$225,000, may be used on any one project or unit of the Missouri River Basin project. Also as in recent years a limitation was placed upon the amount of money that could be expended for information services. By administrative decision this limitation was placed at \$15,546.

The amounts appropriated by activity for fiscal year 1954, together with the amounts to be derived from the special and general funds, follow:

TABLE 11.—*Condensed statement of appropriation, fiscal year 1954, exclusive of trust funds*

General investigations.....	\$3,000,000
Reclamation fund.....	(2,400,000)
Colorado River Dam fund: Colorado River development fund..	(500,000)
General fund.....	(100,000)
Construction and rehabilitation.....	116,269,660
Reclamation fund.....	(52,509,206)
General fund.....	(63,760,454)
Operation and maintenance.....	19,500,000
Reclamation fund.....	(15,075,290)
Colorado River Dam fund.....	(2,179,710)
General fund.....	(2,245,000)
General administrative expenses.....	4,500,000
Reclamation fund.....	(4,500,000)
Emergency fund.....	400,000
Reclamation fund.....	(400,000)
Grand total.....	143,669,660
Reclamation fund.....	(74,884,496)
Colorado River development fund.....	(2,679,710)
General fund.....	(66,105,454)

### *Statistics*

Under the Commissioner's reorganization plan, the Statistics Branch was officially established to provide central statistical services to absorb the continuing reports work performed by the former Reports Branch.

As planned and developed in previous years through extended research into the Bureau's activities from its inception in 1902 to date, these services consist of (a) processing prescribed bureauwide reports required by law, higher authorities and other agencies, relating to the Bureau's various programs, progress, accomplishments, employment, personal services and general administrative expenses; (b) compiling and publishing monthly, annual, and periodic releases that maintain a continuous time series of frequently required historical, current and projected data on all phases of reclamation activities, to serve as ready-reference official sources for Bureau data; (c) Interpreting inquiries, furnishing requested data and making special studies and reports as required for Bureau management and administrative purposes pertaining to project authorizations; and feasibilities, appropriations, programs, progress, accomplishments, utilization of funds, employment, personal services, investments, construction repayments from irrigation and power revenues.

During the fiscal year, economies were made in processing the prescribed reports by certain eliminations and by reductions in frequency in accordance with recommendations of the Commissioner's Washington Office Survey Committee. Research continued during the year to reestablish time series of data on expenditures, cost and related historical data frequently requested. In addition to responses to numerous requests for various data, special studies were conducted and determinations made on items such as forecasts of program achievements, maximum utilization of funds, effect of ensuing year appropriations on current employment, procedures for carry over forecasts and annual project histories, consistency in reporting of power data, analyses of general administrative expenses including ratio of personal services to total expenditures.



TABLE 12.—Appropriations from reclamation and other funds, fiscal years 1902-54

Fiscal year	Reclamation fund		General fund		Colorado River dam fund	Emergency relief funds <sup>2</sup>	Perma- nent ap- propria- tions	Total
	Regular <sup>1</sup>	Power revenue	Regular	Colorado River front work and levee systems				
1902	<sup>3</sup> \$165,000							( <sup>3</sup> )
1903	<sup>3</sup> 5,950,000							( <sup>3</sup> )
1904	<sup>3</sup> 18,440,000							<sup>3</sup> \$2,000,000
1905	<sup>3</sup> 8,758,000							( <sup>3</sup> )
1906	<sup>3</sup> 24,894,961							<sup>3</sup> 15,363,800
1907	<sup>3</sup> 41,979,161							( <sup>3</sup> )
1907	19,186,161							<sup>3</sup> 18,051,161
1908	9,562,038							9,562,038
1909	9,180,700							9,180,700
1910	8,183,300							8,183,300
1911	26,896,790							26,896,790
1912	8,262,367							8,262,367
1913	8,300,508							8,300,508
1914	15,931,922							15,931,922
1915	1,261,411							1,261,411
1916	13,530,000							13,530,000
1917	8,887,557		\$15,000					8,902,557
1918	8,227,000		310,213					8,537,213
1919	9,397,081		443,196					9,840,277
1920	7,300,000		548,927					7,848,927
1921	8,463,000		661,177					9,124,177
1922	20,266,000		335,871					20,601,871
1923	14,800,000		559,530					15,359,530
1924	13,800,000		314,067					14,114,067
1925	11,890,809							11,890,809
1926	12,563,240							13,250,576
1927	7,436,320		40,000	<sup>5</sup> \$687,336				7,511,320
1928	12,148,800		15,000	<sup>5</sup> 107,640				12,271,440
1929	14,138,400	\$190,000	15,000	100,000				14,443,400
1930	8,253,000	390,000	10,660,000	100,000				19,403,000
1931	9,087,000	395,000		100,000				9,582,000
1932	6,971,000	300,000	25,000,000	100,000				32,371,000
1933	2,442,288	375,000	13,050,000					15,867,288
1934	3,003,000	405,000	8,000,000	48,000		\$103,535,000		114,991,000
1935	860,750	316,000				34,076,000		35,252,750
1936	1,022,100	366,000	15,900,000	50,000		25,438,000		42,776,100
1937	12,028,600	316,000	34,850,000		\$350,000	4,873,000		42,671,600
1938	11,991,600	331,000	30,555,000	15,000	500,000	37,047,500	\$1,100,000	81,540,100
1939	10,574,600	366,000	32,980,000	15,000	500,000	<sup>4</sup> 2,502,488	4,600,000	46,533,112
1940	13,269,600	606,000	64,200,000	15,000	575,000	28,347	5,700,000	84,393,947
1941	9,429,600	571,000	63,750,000	15,000	768,000	<sup>4</sup> 124,300	6,600,000	81,009,300
1942	7,446,600	664,400	94,245,031	50,000	1,000,000	<sup>4</sup> 19,961	2,600,000	105,986,070
1943	2,651,060	956,900	86,628,565	47,895	1,379,250	<sup>4</sup> 1,131	2,600,000	94,262,539
1944	2,422,500	2,091,975	35,578,000	75,000	1,443,100	<sup>4</sup> 72,709	5,669,468	47,207,334
1945	5,321,000	2,328,800	17,734,200	340,000	2,200,000	<sup>4</sup> 22,332	5,282,601	33,184,169
1946	34,089,290	2,528,600	82,858,000	612,500	2,550,000		4,491,718	127,130,108
1947	36,315,968	3,284,245	75,931,805	100,000	1,814,330	<sup>4</sup> 30,396	4,806,879	122,222,831
1948	20,127,250	5,549,500	115,420,288		2,088,000		5,545,400	148,730,438
1949	29,952,663	6,999,601	227,402,953		2,450,000	<sup>4</sup> 38,319	4,693,475	271,460,373
1950	35,432,720	9,327,097	312,034,175		2,123,100		8,046,265	366,963,357
1951	37,660,175	9,257,190	222,453,635		2,308,000		6,048,668	277,727,668
1952	42,077,837	9,344,510	180,665,175		2,171,000		6,665,088	240,923,610
1953	61,783,400	11,162,500	130,859,541		2,643,000		7,743,965	214,191,956
1954 <sup>6</sup>	63,585,006	11,299,490	65,505,454		2,454,300		4,610,748	147,545,998
Total	753,640,811	79,721,358	1,949,519,803	2,613,371	29,317,080	192,440,211	786,804,175	3,094,056,809

<sup>1</sup> Prior to fiscal year 1916 funds were made available to the Reclamation Service by allotments authorized by the Secretary of the Interior.

<sup>2</sup> Emergency relief funds include allocations to reclamation from NIRA, PWA, WPA, and ERA funds.

<sup>3</sup> Allotments made prior to Fallon, Nev., conference on July 27, 1907, were canceled and summary allotments issued. Original amounts excluded from total column.

<sup>4</sup> Credit.

<sup>5</sup> Appropriated to reimburse the reclamation fund for Yuma project expenditures.

<sup>6</sup> Rescission of \$600,000 from General Fund and \$225,410 returned to Colorado River Dam Fund have been deducted.

<sup>7</sup> Repayment of advances included: Boulder Canyon, \$20,084,554.50; and All-American canal system, \$1,952,000.

TABLE 13.—The Reclamation fund, fiscal years 1953–55, funds available for appropriation

Receipts and appropriations	Actual, 1953	Actual, 1954	Estimated, 1955
Unappropriated balance brought forward (as of June 30).....	\$74, 719, 171	\$78, 234, 263	\$88, 033, 070
Add items in transit.....			160, 366
Accretions and collections:			
Bureau of Reclamation, 100.....	16, 813, 339	14, 276, 770	13, 110, 000
Other agencies, 200.....	25, 118, 114	27, 943, 980	34, 573, 500
Power revenues, 300.....	32, 166, 768	41, 578, 238	45, 370, 000
Subtotal, accretions and collections.....	74, 098, 221	83, 798, 988	93, 053, 500
Lapsed appropriations.....	2, 599, 286	995, 063	1, 583, 000
Total available for appropriation.....	151, 416, 678	163, 028, 314	182, 829, 936
Less permanently authorized appropriations for:			
Refund of revenue collections.....	225, 000	100, 000	-----
Farmers irrigation district, North Platte project, Nebraska.....	11, 965	10, 748	3, 500
Deduct annual appropriation or estimate for:			
General investigations.....	3, 200, 000	2, 400, 000	3, 150, 000
Construction and rehabilitation.....	49, 155, 000	52, 509, 206	57, 946, 197
Operation and maintenance.....	14, 940, 450	15, 075, 290	18, 257, 222
General administrative expenses.....	5, 250, 000	4, 500, 000	4, 000, 000
Emergency fund.....	400, 000	400, 000	200, 000
Subtotal, annual appropriation or estimate.....	72, 945, 450	74, 884, 496	83, 553, 419
Balance carried forward.....	78, 234, 263	88, 033, 070	99, 273, 017

TABLE 14.—Accretions to reclamation funds by States, fiscal year 1954

State or other accretions	Sale of public land		Proceeds from Oil Leasing Act		Total to June 30, 1954
	Fiscal year 1954	To June 30, 1954	Fiscal year 1954	To June 30, 1954	
Alabama.....			\$1, 258. 67	\$203, 866. 72	\$203, 866. 72
Arizona.....	\$47, 460. 47	\$2, 984, 410. 16	59, 502. 35	271, 419. 04	3, 255, 829. 20
Arkansas.....			6, 893. 38	11, 376. 53	11, 376. 53
California.....	289, 986. 04	9, 818, 169. 38	4, 589, 835. 67	55, 838, 176. 21	65, 656, 345. 59
Colorado.....	153, 459. 91	10, 899, 445. 20	4, 025, 862. 04	20, 676, 888. 52	31, 576, 333. 72
Florida.....				1, 857. 97	1, 857. 97
Idaho.....	220, 353. 06	7, 790, 468. 47	107, 154. 51	496, 496. 14	8, 286, 964. 61
Illinois.....			10. 50	42. 00	42. 00
Kansas.....		1, 041, 529. 43	48, 157. 68	295, 422. 88	1, 336, 952. 31
Louisiana.....			49, 342. 95	534, 987. 77	534, 987. 77
Michigan.....			1, 617. 78	22, 878. 22	22, 878. 22
Mississippi.....			2, 808. 50	10, 933. 91	10, 933. 91
Montana.....	141, 332. 45	15, 882, 092. 99	1, 406, 461. 59	8, 644, 942. 50	24, 527, 035. 49
Nebraska.....	30, 792. 69	2, 198, 738. 10	3, 281. 91	48, 443. 13	2, 247, 181. 23
Nevada.....	19, 449. 91	1, 149, 952. 47	220, 947. 96	1, 456, 714. 18	2, 606, 666. 65
New Mexico.....	108, 840. 31	7, 128, 623. 79	3, 890, 351. 62	26, 311, 429. 58	33, 440, 053. 37
North Dakota.....	4, 582. 37	12, 268, 628. 78	80, 147. 10	621, 630. 83	12, 890, 259. 61
Oklahoma.....	5, 336. 09	5, 968, 525. 24	29, 664. 91	170, 383. 10	6, 138, 908. 34
Oregon.....	435, 057. 12	13, 877, 531. 34	6, 275. 57	47, 183. 71	13, 924, 715. 05
South Dakota.....	13, 913. 20	7, 773, 058. 05	88, 866. 01	350, 554. 23	8, 123, 612. 28
Utah.....	70, 191. 80	4, 715, 160. 40	1, 423, 374. 67	7, 563, 679. 45	12, 278, 839. 85
Washington.....	151, 312. 29	8, 335, 712. 81	1, 986. 97	59, 399. 79	8, 395, 112. 60
Wyoming.....	77, 967. 50	9, 278, 997. 36	8, 717, 435. 96	91, 881, 844. 66	101, 160, 842. 02
Total.....	1, 770, 035. 21	121, 111, 043. 97	24, 761, 238. 30	215, 520, 551. 07	336, 631, 595. 04

OTHER ACCRETIONS

	Fiscal year 1954	Totals to June 30, 1954
Proceeds, Federal water power licenses.....	\$14, 571. 53	\$1, 343, 610. 06
Proceeds, potassium royalties and rentals.....	1, 267, 105. 76	7, 889, 117. 68
Receipts from Naval Petroleum Reserves, 1920–38, act of May 9, 1938.....		29, 778, 300. 23
Proceeds from rights-of-way over withdrawn lands, act of July 19, 1919.....	(4, 204. 65)	11, 372. 52
Lease of lands.....	21, 924. 73	90, 255. 13
Town lot sales.....	67, 285. 47	795, 485. 18
Timber sales, and other miscellaneous items.....	46, 023. 80	310, 380. 67
Total.....	1, 412, 706. 64	1, 376, 850, 116. 51

<sup>1</sup> Grand total.

TABLE 15.—Cost of plant, property and equipment, by States, June 30, 1954

State and project	Completed works						Construc- tion in progress	Other physical property	Total
	Multi- purpose (1)	Irrigation (2)	Electric (3)	Municipal water (4)	Flood control (5)	(6)			
Total.....	\$956,359,524	\$703,821,206	\$500,095,887	\$13,990,834	\$13,182,992	\$348,292,648	\$20,250,647	\$2,555,943,738	
Alaska: Eklutna.....			1,891,806			23,865,336		25,757,142	
Arizona, subtotal.....	90,437,557	49,018,594	103,296,232		3,438,729	14,361,938	66,317	260,619,367	
Boulder Canyon:									
All-American Canal system (California)	2,179,950		33,371,951			273,565		2,179,950	
Hoover Dam and powerplant (Nevada)	44,543,209					70,303		78,188,725	
Colorado River front work and levee system (California-Nevada)			60,386,003		3,438,729			3,509,032	
Davis Dam (Nevada-California)	35,095,082	33,784,836				2,734,926		98,216,011	
Gila	3,394,426		5,241,247			6,718,580		40,569,733	
Parker Dam power (California-Nevada)	5,224,890	10,753,356	4,266,443			144,197	66,317	8,779,870	
Salt River		2,426,024	30,588			4,386,613		24,631,302	
Yuma (California)		2,053,778				33,754		2,457,212	
Yuma Auxiliary								2,087,532	
California, subtotal.....	283,038,557	90,433,200	84,855,874		9,321,412	91,873,336	4,085,808	563,610,187	
Boulder Canyon: All-American Canal system (Arizona)	38,465,219	16,487,976	45,091		3,329,786	66,735		58,394,807	
Cachuma	22,153,769					13,504,610		35,658,379	
Central Valley	216,978,879	62,090,503	66,057,116			74,942,338	4,085,808	424,124,644	
Colorado River front work and levee system (Arizona-Nevada)					5,991,626	218,498		6,210,124	
Davis Dam (Arizona-Nevada)		6,307,624	6,554,927			111,143		6,666,120	
Klamath (Oregon)		2,581,402				84,155		6,391,679	
Orland						426		2,581,828	
Parker Dam power (Arizona-Nevada)	5,440,690		11,793,950			68,769		17,303,400	
Solano						2,882,845		2,882,845	
Truckee storage (Nevada)		2,967,795				23,776		3,396,361	
Yuma (Arizona)			404,790					198,124,166	
Colorado, subtotal.....	45,497,408	96,592,648	29,073,884			26,940,226		153,409,819	
Colorado-Big Thompson	28,462,889	71,634,277	28,423,390			24,889,263		200,369	
Fruitgrowers Dam		6,867,055	213,669					7,080,724	
Grand Valley		3,895,274						3,895,274	
Mancoos			436,825					14,672,454	
Missouri River Basin	13,217,589					1,018,040			





TABLE 15.—Cost of plant, property and equipment, by States, June 30, 1954—Continued

State and project	Completed works						Construction in progress (6)	Other physical property (7)	Total (8)
	Multi-purpose (1)	Irrigation (2)	Electric (3)	Municipal water (4)	Flood control (5)				
Nevada, subtotal.....	\$53,358,744	\$9,861,880	\$35,320,814		\$158,921	\$380,281	\$7,073,722	\$106,154,362	
Boulder Canyon: Hoover Dam and power plant (Arizona).....									
Boulder City Municipal Office.....	49,928,783		31,200,390			259,221	1,614,553	83,062,947	
Colorado River front work and levee system (Arizona-California).....					158,921	569	5,459,169	5,459,738	
Davis Dam (Arizona-California).....	3,429,961		3,713,714					158,921	
Humboldt.....		1,214,321						7,264,166	
Newlands.....		7,555,136	344,343					1,214,321	
Parker Dam (Arizona-California).....		1,092,423	2,367					7,899,479	
Truckee Storage (California).....								2,367	
New Mexico, subtotal.....	9,736,392	27,918,435	7,643,807		263,930	5,727,413	5,050	1,092,423	
Carlsbad.....		4,242,363							
Fort Sumner.....		2,427,292							
Hondo.....		371,788				837	5,050	4,243,200	
Middle Rio Grande.....	1,605,543							2,432,342	
Rio Grande (Texas).....	8,130,849	5,547,253	7,643,807		263,930	3,628,072		371,788	
Tucumcari.....		15,329,739						5,233,615	
Vermejo.....								21,734,457	
North Dakota, subtotal.....	7,919,587	2,599,447	17,868,462			1,768,827		15,510,798	
Buford-Tronton.....		942,607				4,790,527		1,768,827	
Fort Peck (Montana).....								33,178,023	
Lower Yellowstone (Montana).....		555,682	1,313,607					942,607	
Missouri River Basin.....	7,919,587	692,063	16,554,795			159,925		1,473,592	
Williston.....		409,095						565,682	
Oklahoma: W. C. Austin.....	6,955,908	5,565,712		\$152,026				29,797,047	
Oregon, subtotal.....		48,858,670	515,304			942,820	13,845	409,095	
Arnold.....									
Baker.....		281,589						281,589	
Boise (Idaho).....		4,275						4,275	
Deutessch.....		11,635,160	515,304			60,921		12,211,385	
Burnt River.....		601,026						601,026	

Grants Pass.....	7,944,190				566,121	566,121
Klamath (California).....					815,778	13,845
Ochoco.....	18,215,602					
Owyhee (Idaho).....	5,310,004					18,215,602
Umatilla.....	4,866,824					5,310,004
Valle.....						4,866,824
South Dakota, subtotal.....	17,792,269	13,099,127			21,518,279	53,548
Belle Fourche.....	4,665,477				393,904	5,059,381
Missouri River Basin.....	32,363	13,099,127			21,124,375	51,174,356
Rapid Valley.....	927,326					927,326
Texas, subtotal.....	23,499,080	464,801			62,812	29,458,793
Balmorhea.....	407,741					407,741
Colorado River.....	4,843,731	464,801			62,812	23,963,881
Rio Grande (New Mexico).....	180,628					4,906,543
Rio Grande River rectification.....						180,628
Utah, subtotal.....	14,957,101	91,969	12,818,712		5,935,614	53,426,519
Hyrum.....	953,854					953,854
Moon Lake.....	1,799,859					1,799,859
Newton.....	712,592					712,592
Ogden River.....	5,013,284					5,013,284
Provo River.....	3,632,847		12,818,712		467,600	31,876,260
Sanpete.....	433,940					433,940
Scotfield.....	943,837					943,837
Strawberry Valley.....	3,345,940	91,969			5,468,014	3,498,994
Weber Basin.....						5,468,014
Weber River.....	2,725,885					2,725,885
Washington, subtotal.....	167,001,004	108,643,356			47,004,723	523,390,241
Columbia Basin.....	155,769,997	107,363,586			42,341,444	472,290,722
Okanogan.....	1,481,324				21,305	1,505,629
Yakima.....	39,227,181	1,279,770			4,641,974	49,593,890
Wyoming, subtotal.....	45,947,528	40,471,613			14,842,881	155,195,997
Eden.....	2,638,173				1,332,110	3,970,283
Kendrick.....	9,424,616				6,156,983	29,289,241
Minidoka (Idaho).....	2,170,665	8,548,473				2,170,665
Missouri River Basin.....	32,676,359	26,749,760			4,216,116	63,642,235
North Platte (Nebraska).....	3,256,060	1,260,604			197,837	12,884,284
Palisades (Idaho).....					189,556	189,556
Riverton.....	2,970,469	466,121			1,455,162	21,332,634
Shoshone (Montana).....	1,885,471	3,446,655			1,295,117	21,717,099
Nonproject property.....	223,483					4,631,616

NOTE.—Name of State in which balance of project is located is indicated by parentheses. Irrigation plant listed at gross construction cost prior to deduction of chargeoffs authorized by Congress.



## COMPTROLLER

The Bureau's program of enforcement of financial policy and internal and external audit activity was intensified during the 1954 fiscal year.

To attain maximum utility and prompt recognition of audit disclosures, a summary letter report of the auditor's findings was adopted. This type of report immediately places before management the more important disclosures, particularly those requiring corrective action. A program of prompt issuance of audit reports immediately after close of examinations was prescribed. Onsite field review by a supervising auditor of the findings and report structure during the course of the audit examination is speeding up report production and frees the auditor for new assignments. Maximum utilization of staff is thus obtained through reassignment of the auditors to new examinations upon completion of their assignments.

During the year the Comptroller's office completed a comprehensive audit and special cost allocation study of the Yuma and Yuma Auxiliary projects.

A special audit of irrigation operations since 1943 of the Gila project was completed to establish results of operations and provide data for cost allocations under repayment contracts.

The office of Comptroller was designated to supervise and direct the audit work at the Boulder Canyon project incident to the determination of nonproject costs pursuant to Public Law 841. The several studies being made as an adjunct to this assignment also will develop factual data needed to resolve other Boulder Canyon project problems.

## LEGAL

Pursuant to the reorganization of the Solicitor's office, the office of the Associate Solicitor, Reclamation and Power, was established. The responsibility of that office includes the legal phases of matters arising in connection with the programs and activities of the Bureau of Reclamation.

The Associate Solicitor supervises the work of the Assistant Solicitor, Reclamation, who is initially responsible for all legal matters connected with the work of the Bureau. As heretofore, attorneys assigned to this task have participated in the solution of the sundry legal problems of the Bureau of Reclamation in such varied fields as construction, supply contracts and contract administration, negotiation of repayment contracts, problems connected with the generation and disposition or purchase of electric power and energy, condemnation proceedings, tort matters, and advice on daily operations problems. The principal legislation and litigation and claims are discussed below.

### *Legislation*

Of the legislation affecting the Bureau of Reclamation enacted during the fiscal year 1954, the most far-reaching was the act of August 13, 1953 (Public Law 258, 83d Cong.) relating to the exchange and amendment of farm units on Federal reclamation projects. In addition to covering these matters, the new act (which replaces subsection M of the 1924 Fact Finders' Act) permits the establishment of public land farm units containing maxima of 160 irrigable acres and 320 acres in all.

The fiscal year 1954 also saw the enactment of bills consolidating the Parker and Davis projects (Public Law 373), terminating the interest of the Shoshone and Arapahoe Indian tribes in certain lands on the Riverton project and providing compensation therefor (Public Law 284), approving amendatory repayment contracts with the Hermiston, West Extension, and Roza districts (Public Law 404, Public Law 462), providing for the marketing of power produced at the International Boundary and Water Commission's Falcon Dam (Public Law 406), and increasing the amount authorized to be appropriated for construction of the Eklutna project (Public Law 260).

No bills authorizing the construction of new projects were enacted during the fiscal year, but a number were in the last stages of congressional consideration on June 30 and were enacted shortly thereafter.

### *Litigation*

1. *Rank v. Krug, et al.*, the complaint in this case originally was filed in 1947 in the superior court of the State of California in and for the county of Fresno. Upon the motion of the Department of Justice the case was removed to the United States District Court for the Southern District of California, Northern Division. At about the same time, four other actions were filed for similar relief against the same parties. These actions also were removed to the same United States district court.

The court has jurisdiction of four of the named defendant officials of Region 2 of the Bureau of Reclamation, including the Regional Director. A number of irrigation districts in the Friant-Kern Canal and Madera Canal areas also are defendants. The State of California, through its attorney general, and the city of Fresno are intervenors in the case. The plaintiffs also filed separate suits in the same United States district court for compensation under the Tucker Act.

All of these suits directly involve the water rights of a class alleged from time to time to comprise 1,400 landowners claimed to be affected by the operation of Friant Dam and Reservoir.

The plaintiffs claim, as a class, that they own riparian, appropriative, prescriptive, and ground water rights to the full flow of the San Joaquin River, unrestricted by operations by the United States. For their use they seek an absolute injunction against the operation of Friant Dam and its diversion works. In the alternative, they request a regulated flow of the river to simulate the optimum conditions that a flow of 2,500 cubic feet per second would provide for downstream water users at any time that such water is available in Friant Reservoir. As a second alternative, they request a physical solution to simulate a flow of 2,000 cubic feet per second, plus the installation and operation of some 14 check dams in the river, which would cost several million dollars. As a third alternative, the plaintiffs request relief by way of "reverse condemnation," as that term is used by the California courts.

As against these pleas of the plaintiffs, the defendants have interposed a general denial and have submitted plans for physical solutions of the problems.

In early 1950, motions for a preliminary injunction and to dismiss (except as to the Tucker Act cases) were consolidated and heard at Los Angeles. Both motions were denied, except that in one of the incidental cases the motion to dismiss was granted. The decision on these motions is reported in *Rank v. Krug*, 90 F. Supp. 773 (1950).

During July and August 1951, further hearings were held at Fresno on a renewed motion for a preliminary injunction. The result was a stipulated order covering phases of the operation of the river for a limited period of time.

In December 1951 and January 1952, pretrial hearings were held, an order was made thereon, and the case was set for trial to begin at Fresno on January 29, 1952. The trial was concluded during July of 1953.

In the spring of 1953 an order was entered requiring certain releases from Friant Dam. The United States went into the circuit court and in an opinion dated August 4 this order was dissolved. The basis of the decision was that the order affected property of the United States and that the United States was not a party. Subsequently during August the plaintiffs moved to join the United States as a party and to reopen the trial. The United States was joined by order of the court on September 18, 1953. The United States then applied to the circuit court for a motion to restrain further proceedings in the case and to dismiss the United States as a party. On February 1, 1954, the court denied the motion. The basis of the denial was to the effect that after such a long trial it would be premature to consider the issues raised in a special proceeding and that the issues could be considered on appeal. Motion to reopen the trial is still pending.



2. *In the Matter of the California Oregon Power Co.*, on April 16, 1951, Copco filed an application with the Federal Power Commission for a license for its proposed Big Bend No. 2 project, identified by the Federal Power Commission as project No. 2082. The Secretary of the Interior following his recommendation to the Commission that the application be denied for the reasons that it might impair the rights to water of the United States, would be detrimental to irrigation and development of land in the Klamath project, and would foreclose comprehensive water resource development in the Klamath River Basin was formally admitted as a party to the proceeding and to a companion proceeding. (Docket No. E-6390, discussed separately.)

The Presiding Examiner's Recommended Decision on project No. 2082 (October 2, 1953) recommended that Copco be granted a license subject to the condition that within 1 year the company should obtain an extension or renewal, for the 50-year term of the license, of the 1917 contract with the United States covering the operation of Link River Dam. The company filed exceptions to the recommended decision on the ground that the trial examiner erred in determining that the Commission had jurisdiction on the basis of the company's use of surplus water from a Government dam. The Department did not file exceptions but appeared at the hearing before the Commission on December 1, 1953. The purpose of the appearance was to counter statements made in Copco's exceptions negating the water rights of the United States. On January 28, 1954, the Commission issued its opinion No. 266 affirming the recommended decision of the trial examiner. Copco's petition for a rehearing was denied. Copco has appealed this decision to the United States Court of Appeals for the District of Columbia, No. 12235.

3. *In the Matter of the California Oregon Power Co.*, this proceeding is a companion to project No. 2082 and was commenced by an order to show cause, issued November 28, 1951, to Copco by the Federal Power Commission. The order required Copco to show cause why it should not file applications for licenses for five of its existing hydroelectric plants on the Klamath River in Oregon and California.

The main issues in this proceeding are whether the Commission has licensing jurisdiction over the five plants, and, assuming that the Commission does have jurisdiction, on what particular ground it should be based. Staff counsel for the Commission contended that several bases of jurisdiction exist, among others, that the plants utilize surplus water from a Government dam.

The dam in question is the Link River Dam, constructed by Copco in 1917 pursuant to a 50-year contract between Copco and the Bureau of Reclamation. In essence, the contract provided for the construction of the Link River Dam by Copco and the transfer thereof to the United

States, the operation of Link River Dam by Copco to meet certain irrigation requirements of the Klamath project, and the reduction, by Copco, of certain power rates for pumping in the Klamath project. Thus, although the primary purpose of the dam is to provide water for irrigation of the Klamath project, Copco may also make limited releases of water for the generation of power. Copco has 2 plants at Klamath Falls, 1 at Keno, Oreg., and 2 near Copco, Calif., all of which are operated through water releases from Link River Dam.

The presiding examiner's recommended decision on docket No. E-6390 (Oct. 2, 1953) holds that the Commission has jurisdiction under the Federal Power Act on grounds, among others, that the plants utilize surplus water from Link River Dam. Although originally opposing this particular ground of jurisdiction, the Secretary of the Interior did not file exceptions to the recommended decision because, in effect, the interests of the United States are protected by the condition to the license imposed in project No. 2082. Copco, however, filed exceptions and, for reasons indicated in the discussion of project No. 2082, the Department appeared at the hearing before the Commission on December 1, 1953. The Commission's decision No. 266 (Jan. 28, 1954) affirmed the "surplus water" as a jurisdictional basis for license and Copco has appealed this decision to the United States Court of Appeals for the District of Columbia, No. 12236.

4. In connection with the action *State of Arizona v. State of California, et al.*, in the Supreme Court of the United States leave to intervene was granted in January 1953 on the motion of the United States. Pursuant thereto, petition of intervention on behalf of the United States of America was filed December 8, 1953. Motion on behalf of the State of Nevada for leave to intervene and petition of intervention on behalf of the State of Nevada were also filed with the Court during December 1953. Thereafter, answers to said motion and petition were separately filed by the States of Arizona and California. Shortly before the close of the fiscal year, the Court appointed a special master in the case.

By this action the State of Arizona seeks a determination of its rights in and to the use of the waters of the Colorado River, as against such rights claimed by the defendants under the Colorado River compact, the Boulder Canyon Project Act, and the California Limitation Act.

5. The action entitled *United States v. Coachella Valley County Water District*, in the United States District Court, Southern District of California, Central Division (Los Angeles), was instituted to obtain a declaratory judgment to determine the respective rights and obligations of the parties under their contract of December 22, 1947,

for construction of the lateral distribution system and other works, Coachella division, All-American Canal system, particularly as to whether or not the district was liable for increased construction costs over and above \$13 million, the amount specified in the contract. On March 12, Judge Westover rendered his opinion finding against the United States. Thereafter, motion for new trial was overruled and notice of appeal was filed December 9, 1953. On January 29, 1954, pursuant to stipulation of the parties, an order dismissing said appeal was entered and the case closed.

6. *Hudspeth County and Reclamation District No. 1 v. Robbins, et al.* (an employee of the Bureau), a suit for declaratory judgment to establish the water rights of the plaintiff and to enjoin officers of the United States from impounding and diverting certain waters allegedly belonging to the district was originally filed in the district court for Hudspeth County, Tex., and later removed to the United States District Court, Western District of Texas, El Paso Division. On the plaintiff's motion for partial summary judgment and on the defendant's motion for summary judgment, the Court ordered that relief sought by the plaintiff be denied. The case was appealed, and following oral hearings, remanded with directions to dismiss the complaint for want of jurisdiction. Plaintiff has notified the defendant of its intent to file a petition for a writ of certiorari in the Supreme Court of the United States.

7. *El Paso County Water Improvement District No. 1 and the United States, et al. v. The City of El Paso*, was filed in the United States District Court, Western District of Texas, El Paso Division, in January 1953, to resolve a number of controversies existing between the litigants, including the extent of certain alleged water rights of the city, the validity of obligations previously entered into, the validity of conveyances of the Franklin Canal right-of-way, and obligations for maintenance of bridges. Several hearings have been held for discovery purposes. At the end of the fiscal year, the trial date has not been set.

8. Two cases, both entitled *Provo Bench Canal & Irrigation Company et al. v. Linke, State Engineer, and the United States*, to review decisions of the State engineer approving applications by the United States to change the point of diversion and place of use of water acquired by the United States for the Provo River project, were tried on their merits in the District Court of the Fourth Judicial District in and for Utah County, State of Utah. At the close of the fiscal year, the cases were under advisement.

9. The case of the *United States v. Alpine Land & Reservoir Company* for adjudication of water rights on the Carson River, Nevada and



California, is pending in the United States District Court for the District of Nevada, on objections to a proposed decree and petition to reopen for the introduction of additional evidence. The case has been pending for 29 years.

10. *Desert Beach Corporation v. United States Imperial Irrigation District; Coachella Valley County Water District; et al.*, was filed in the United States District Court for the Southern District of California, Central Division, in October 1953. This is an action seeking to recover \$450,000 in damages to plaintiff's properties alleged to have been caused by the negligent and wrongful acts or omissions of the defendants. On April 12, 1954, an order was entered dismissing the United States from the above action on the ground that plaintiff's complaint failed to allege any specific act of negligence by Government employees acting in the course of their employment. Motions by the Imperial and Coachella districts for dismissal on the ground of lack of diversity of citizenship were taken under advisement by the court. On June 2, 1954, plaintiff filed its first amended complaint and the United States thereafter again moved to dismiss the action on the ground that the amended complaint fails to allege any specific act of negligence on the part of Government employees and also based on the "discretionary act" provision (28 U. S. C. A. 2680) of the Federal Tort Claims Act.

11. *Atchison, Topeka and Santa Fe Railway Company v. United States*, petition was filed in the court of claims in February 1954 for damages allegedly arising in connection with the construction of Elephant Butte Dam from heavy siltation and sedimentation in the San Marcial area. Answer was filed on June 9, 1954.

12. The following cases are pending in the court of claims involving the claims of contractors against the United States for alleged increased costs, liquidated damages, damages for delays, and exhaustion and shortage of funds: *Peter Kiewit Sons Co. et al. v. United States*, No. 283-52; *Abbett Electric Corp. v. United States*, No. 591-53; *Winston Brothers Company et al. v. United States*, Cong. 6-52; *A. S. Schulman Electric Co. v. United States*, No. 234-53; *D. J. Killoren v. United States*, No. 625-53.

13. Various other actions relating to application for the appropriation of water, condemnation proceedings, and tort claims affecting the Bureau of Reclamation were settled, continued, or filed during the fiscal year.

14. Contested validation proceedings involving the Ivanhoe and Madera irrigation districts and the Santa Barbara County Water Agency are in the appeal stage before the Supreme Court of California.

## ORGANIZATION AND METHODS DIVISION

The Bureau of Reclamation organization and procedures were streamlined in the 1954 fiscal year in order to accomplish its work more effectively and at less cost.

All work of a technical nature relating to project development, irrigation and power was transferred to the office of the assistant commissioner and chief engineer, Denver, Colo. The activities of the Washington office of the Commissioner were limited to matters of broad policy and liaison, a number of the Washington office functions being eliminated and others consolidated.

The regions of the Bureau were reorganized to place greater emphasis on the engineering responsibilities of the Bureau—the construction and operation of essential irrigation and power projects.

The administrative service activities of the Bureau were drastically reduced and the functions consolidated wherever practicable.

Plans were developed and instituted for a complete revision of the Bureau's administrative release system. Under these plans the former voluminous Reclamation Manual will be replaced by a single document in which will appear the basic Bureau organization, the delegations of authority to subordinate officials, and the policy guide lines by which Bureau officials will conduct Bureau operations. Supplementing this one-volume executive handbook will be a limited number of procedural handbooks which will guide the technical specialists in the performance of their work. This revised system is expected to provide effective instructions at substantial savings in printing, distribution, and other costs.

The incentive awards program, through which employees are encouraged to improve Bureau operations, continued to receive attention. During the year, 330 employee suggestions were processed, of which 130 or 39.4 percent were adopted. For these suggestions employees were paid \$5,210. These suggestions represented a savings of \$123,388 to the Bureau and resulted in improved procedures and better performance of Bureau's work. Superior accomplishment awards were granted to 53 employees for the development of ideas which promoted economy in Bureau operations or for superior performance of duties. In addition, five awards were granted by the Secretary to Bureau employees for improvements in their operations, resulting in \$267,903 savings. While the total dollar savings from all phases of the incentive awards program amounted to \$392,791, substantial additional intangible benefits accrued to the Bureau through better working procedures, improved working conditions, the promotion of safety on the job, and better employee morale which results from the performance of duties more economically and effectively.

## PERSONNEL DIVISION

Bureau employment dropped from 11,665 full-time employees at the beginning of the year to 10,349 at the end. The decrease was gradual throughout the year and much of it was accomplished by not filling vacancies. There were, however, a number of reductions in force as reorganizations were accomplished or projects completed.

Personnel offices were reorganized as part of the overall Bureau reorganization. The safety function was transferred from the Personnel Division in Washington to the office of the assistant commissioner and chief engineer in Denver. The Personnel Field Division in Denver was abolished. Some personnel operations of a bureau-wide nature will continue to be performed in Denver including report and analysis of monthly employment forecasts, central control rosters of personnel, central applicant supply files, and the operation of the central board of civil-service examiners. Other bureauwide functions formerly performed by the Personnel Field Division were transferred to the Washington Office.

With the marked decrease in total employment, only limited recruitment in the lower grades was necessary. It was virtually impossible to recruit beginning engineers. The Bureau, however, continued its college relations program by sending representatives to visit colleges in the western states and taking every opportunity to keep the Bureau's engineering story before faculty members and students. During the year the central board of the civil-service examiners had examinations opened to engineers, engineering aids, draftsmen, and construction inspectors. The Board processed 431 applications, leading to 52 placements.

The personnel management review and improvement program, as well as some training and development activities, was suspended during the reorganization.

Throughout the Bureau extensive position classification review was performed and subsequent realignment of duties and revision of position requirements accomplished. This was necessitated by program changes and reorganization of the Bureau. Reviews of proposed Civil Service classification standards continued to be made, and a new set of standards covering irrigation operations was developed and submitted to the Commission for approval. The regional offices of the Civil Service Commission conducted no classification audits during the fiscal year in field offices, but substantial negotiation continued with some offices in connection with Civil Service Commission audits performed last year.



## PROCUREMENT AND PROPERTY MANAGEMENT DIVISION

Bureau reorganization during the year resulted in combining the offices of the Director of Supply, Washington, and the Supply Field Division, Denver, into the Procurement and Property Management Division, Washington. Key personnel of the Supply Field Division in Denver were transferred to the Washington office. This consolidation is expected to bring about a more unified management and direction of activities and accomplish a closer liaison with the Department in the promulgation and implementation of supply policies and directions.

Total volume of procurement awarded by purchase orders and contracts by the Bureau for fiscal year 1954 approximated \$18,577,000, compared with a volume of \$26,584,000 for the preceding fiscal year. A reduction in personnel engaged in purchasing activities of 33 percent was effected during the year, while the total number of purchase actions decreased only 21 percent. Increased efficiency resulted from adoption of simplified purchase methods. The decrease in procurement activity has been more than offset by the number of sales of surplus property occasioned by an accelerated disposal program within the Bureau.

Personnel changes had little effect on the personal property disposal program and volume was maintained at about the same level as the preceding year. A total of \$2,585,169 (original cost) in personal property was sold with a cash return of \$513,457 (20 percent). In addition, several hundred thousand dollars worth of property was transferred within the Bureau and departmental agencies, thus increasing utilization within the Government service of property for which the owning agency had no further requirement.

## GENERAL SERVICES DIVISION

Established under the Bureau reorganization program, General Services Division operations during the 1954 fiscal year included administrative control over reclamation records management; communication; publications; duplicating, printing and distribution; still and motion picture films; stenographic and typing services; library activities; correspondence; space management and utilization; and other related functions.

Positive measures were taken during the year to make requested file material quickly available. Revisions and extensions of the standard correspondence file system were made to keep file procedure in step with administrative requirements. Material not likely to be required in current operations was transferred from active to inac-

tive files. Both active and inactive files are recurrently purged to eliminate material which has lost its administrative and research values.

Steps were taken to discontinue the Bureau's records service center in Denver, and to utilize the facilities of the Federal records center at that point for the storage of inactive field records.

A program was initiated for storage in the Denver Federal records center of completed land acquisition case files and related original land title papers. Approximately 200 cubic feet of these records were transferred from the National Archives in Washington to the Denver center.

As of June 30, 1954, Bureau volume totaled 124,304 cubic feet; useless records destroyed totaled 10,679 cubic feet; and 4,468 cubic feet of records were transferred out of Bureau custody, consisting mostly of inactive records stored at Federal records centers.

To a large extent, the Bureau's individual teletype system was discarded for the system provided by the General Services Administration—the PBS system.

By resorting to this service, the Bureau in Washington, D. C., alone cut its communication cost by 30 percent, and greatly reduced the time required to transmit messages to the field. Savings also accrued to the field.

The cost of long distance telephone communication was reduced 66 percent at Washington, D. C.

Various actions were taken to improve the Bureau's communication handling procedures, including steps to effect economies in postage costs due to departmental decision to prepay postage on its mailings.

### *Publications*

Responsibility in the field of processing entailed review and correction of the layout and design for any complicated publication originating in the Bureau in Washington and produced in the departmental plant. The result was an appreciable improvement in the appearance of such publications at cheaper production cost.

The Bureau received 1,349 requests at Washington, D. C., for publications and, in response, distributed 12,104 copies. Of this number, 138 were congressional requests for 694 publications. Most out-of-the-Bureau requests were from the other Government agencies. The Department of State requested many titles to supply foreign demands.

Publications distributed from Denver, Colo., the Bureau's chief distribution point, totaled more than 4,500, in addition to 18,000 pamphlets and reports. Sales of Bureau publications sold for the Superintendent of Documents totaled \$4,430. Nearly 65 percent of the sales were made to citizens of other countries.

Six hundred ninety-two films were distributed from Washington to television stations, agricultural and engineering groups at universities and colleges, other educational institutions, water users' associations, organizations of farmers, conventions, foreign countries, foreign visitors, and others. A policy was established which enables the Bureau to ship films by fourth-class parcel post under the cheaper book rate which will save borrowers approximately \$1,500 per year and cost the Bureau less than shipping by express.

The Bureau at Washington received 164 requests for 1,645 photographs to illustrate Bureau publications, encyclopedias, various agricultural and engineering magazines, and newspapers.



# Bonneville Power Administration

William A. Pearl, *Administrator*



## FINANCIAL RESULTS OF OPERATIONS

**P**RECIPITATION throughout the Pacific Northwest was above the annual average during fiscal year 1954. Consequently stream flows in the Columbia River Basin were very favorable and resulted in increased power output at the dams. Another reason for the increase was the installation of nine additional generating units at Big Cliff, Detroit, Hungry Horse, and McNary.

As a result gross revenue of the Columbia River power system amounted to \$45,317,693, the largest for any year since inception of the program. This was an increase of \$6,142,484 or 15.68 percent over the \$39,175,209 gross in fiscal year 1953, when low water conditions in the area decreased output at the generating plants. The reason for the decrease in net revenue is the higher construction costs of the new dams and generating facilities coming into service, and consequent increases in depreciation and interest expense. Operating expenses also increased due to the installation of major transmission facilities prior to full development of the generating projects.

Table I shows a statement of revenue and expenses of the system. The data are commercial cost accounts kept in accordance with the Federal Power Commission system of accounts prescribed for electric utilities and are condensed from the auditor's report.

TABLE I.—*Columbia River power system—condensed summary of revenues and expenses—operating projects only*

	Fiscal year 1953	Fiscal year 1954	Total to June 30, 1954
Operating revenues.....	\$39,175,209	\$45,317,693	\$349,746,787
Expenses of operation, maintenance, etc.....	10,856,179	12,804,967	95,424,404
Provision for depreciation.....	9,410,048	11,638,135	66,046,627
Interest expense.....	8,983,109	12,248,197	84,883,400
Miscellaneous deductions, net.....	358,281	(11,316)	1,617,406
Total deductions.....	29,607,617	36,679,983	247,971,837
Surplus net revenues from operations.....	9,567,592	8,637,710	101,774,950

### *Summary of Revenue*

Table II summarizes by customer categories the source of revenue by fiscal years to and including 1954. The aluminum industry accounted for 35.18 percent of the total revenue for fiscal year 1954 while other industries accounted for 11.96 percent, slightly over 47 percent of the total gross revenue for the year. Sales to publicly owned utilities were 32.84 percent of the total and privately owned utilities, 17.39 percent. Other operating revenue made up the balance of 2.63 percent. Increased sales occurred in all categories of those for fiscal year 1953 with aluminum, \$2,400,000; other industries \$700,000; publicly owned utilities \$1,000,000, and privately owned utilities \$1,640,000.

### *Repayment of Federal Investment*

As of June 30, 1954, the gross Federal investment in the power portion of all of the generating projects in operation and in the related transmission system amounted to \$1,240,790,232, as shown in table IV. This is the total of all funds appropriated and requisitioned for construction and operations, together with indirect items such as WPA expenditures and other funds transferred from other Federal agencies plus the interest charge at 2½ percent annually on the unrepaid balance. A summary of the interest accumulation is shown in table III.

TABLE II.—Revenue by class of customers through fiscal year 1954

Class of customer	1949 and prior	1950	1951	1952	1953	1954	Total to June 30, 1954	1954 percentage (dollar revenue)
Industry:								
Aluminum.....	\$75,416,310	\$12,133,254	\$13,523,276	\$13,376,207	\$13,545,562	\$15,944,356	\$143,938,965	35.18
Other 1.....	18,437,764	2,677,580	3,774,705	4,650,425	4,715,747	5,417,177	39,673,398	11.96
Publicly owned utilities.....	20,612,420	8,409,428	9,947,909	12,973,025	13,882,890	14,882,997	80,708,669	32.84
Privately owned utilities.....	38,630,918	7,587,963	8,525,609	8,526,775	6,239,276	7,882,879	77,393,420	17.39
Other operating revenue.....	4,589,783	389,291	417,529	653,714	791,734	1,190,284	8,032,335	2.63
Total operating revenue.....	157,687,195	31,197,516	36,189,028	40,180,146	39,175,209	45,317,693	349,746,787	100.00

1 Includes sales to Federal agencies.



TABLE III.—Columbia River power system—Summary of interest on Federal investment as of June 30, 1954

Interest during construction, to be returned during repayment period as part of the Federal investment:	
Transmission system.....	\$4, 697, 557
Bonneville Dam project.....	2, 332, 775
Columbia Basin project .....	9, 727, 004
Hungry Horse project.....	4, 708, 542
McNary Dam project.....	14, 751, 905
Albeni Falls project.....	700, 068
Detroit and Big Cliff.....	2, 542, 532
Subtotal.....	\$39, 460, 383
Interest on costs at projects allocated to future river regulation, to be returned as part of repayment of future downstream projects:	
Columbia Basin project.....	12, 934, 026
Hungry Horse project.....	433, 144
Albeni Falls project.....	124, 616
Subtotal.....	13, 491, 786
Interest charged to operations:	
Transmission system.....	31, 097, 858
Bonneville Dam project.....	18, 065, 858
Columbia Basin project.....	31, 976, 741
Hungry Horse project.....	2, 351, 923
McNary Dam project.....	615, 480
Albeni Falls project.....	154, 496
Detroit and Big Cliff.....	621, 046
Subtotal.....	84, 883, 402
Gross interest accumulation.....	137, 835, 571

All receipts from power sales and miscellaneous sources allocable to power, except for small amounts transferred to the continuing fund, are deposited in the Treasury to repay the Federal investment. The continuing fund established by the Bonneville Act is maintained to meet emergencies and insure continuing operation.

The gross Federal investment has been periodically reduced and, as of June 30, 1954, the unpaid balance was \$900,224,643 to be repaid out of revenue from future operations. Total repayment to date includes \$170,155,673, representing the payment of all expenses incurred since inception of the program and \$170,409,916 repaid on the capital investment of \$1,070,634,559, as shown in table IV.

Inasmuch as no increase in the basic \$17.50 kilowatt year rate will be made for at least 2 years from December 1954, additional generation scheduled for future years, while increasing gross revenue will reflect lower net revenue due to higher construction costs together with added interest and depreciation expenses for the newer projects.

A rate adjustment may be made, if necessary, and after approval by the Federal Power Commission, to become effective on December 20 of the year 1956 or 1957 or 1958.

TABLE IV.—*Columbia River power system—summary of Federal investment in operating power projects and repayment as of June 30, 1954*

	Gross investment	Repayments	Net investment
Investment in current expenses:			
Operation, maintenance, etc.....	\$85,272,271	\$85,272,271	-----
Interest <sup>1</sup> .....	84,883,402	84,883,402	-----
Total current expenses.....	170,155,673	170,155,673	-----
Investment in capital assets:			
Electric plant, inventories, etc. <sup>2</sup> .....	1,013,006,646	170,409,916	\$842,596,730
Unexpended appropriations.....	57,627,913	-----	57,627,913
Total capital investment.....	1,070,634,559	170,409,916	900,224,643
Total Federal investment.....	1,240,790,232	340,565,589	900,224,643

<sup>1</sup> The Columbia River power system does not receive appropriations for payment of interest, but imputes and includes in its accounts provisions for interest expense and returns receipts to the Treasury in repayment of such expenses.

<sup>2</sup> Includes interest during construction of \$39,460,383 which will be repaid to the Treasury as part of the capital cost of electric plant, and \$13,491,786 of interest charged to future downstream regulation recoverable from operations of future downstream hydroelectric plants.

A summary of plant accounts as of June 30, 1954, is shown in table V.

TABLE V.—*Columbia River power system—summary of plant accounts in operating projects as of June 30, 1954*

Project	Total	Allocation	
		Nonpower	Power
Bonneville Power Administration.....	\$335,171,962	-----	\$335,171,962
Bonneville Dam project.....	86,947,927	\$27,329,300	59,618,627
Columbia Basin project.....	481,932,267	274,422,597	207,509,670
Hungry Horse project.....	106,933,312	20,810,894	86,122,418
Albeni Falls project.....	27,611,778	258,722	27,353,056
McNary Dam project.....	261,344,511	24,942,819	236,401,692
Detroit and Big Cliff project.....	65,750,950	27,250,314	38,500,636
Total plant.....	1,365,692,707	375,014,646	990,678,061
Less: Combined reserve for depreciation.....	-----	-----	63,777,062
Total less reserve.....	-----	-----	926,900,999

Based on individual projects the return of power capital investment has been as follows:

Project	Power capital investment	Repaid as of June 30, 1954	Percent repaid	Net power investment
Bonneville Power Administration.....	\$347,767,945	\$90,064,194	25.90	\$257,703,751
Bonneville Dam project.....	59,813,926	21,790,983	36.43	38,022,943
Columbia Basin project.....	221,462,229	51,031,697	23.04	170,430,532
Hungry Horse project.....	87,184,051	2,855,592	3.28	84,328,459
Albeni Falls project.....	26,941,232	302,979	1.13	26,638,253
McNary Dam project.....	231,322,397	3,535,258	1.53	227,787,139
Detroit-Big Cliff project.....	38,514,866	829,213	2.15	37,685,653
Total.....	1,013,006,646	170,409,916	16.82	842,596,730

Foregoing data on repayment of the investment are based on cost accounts maintained in accordance with the Federal Power Commission uniform system of accounts. On a statutory repayment basis, the repayment percentages are the same as in the above table for the Bonneville Power Administration and Bonneville Dam, but different for the Columbia Basin project, since in the case of the latter (1) power revenues must pay operation and maintenance costs of Grand Coulee Dam and powerplant allocated to irrigation, (2) interest expense is computed at 3 percent rather than 2½ percent, and (3) other differences such as the exclusion of interest during construction in the pay-out accounts of the Columbia Basin project.

## SUMMARY OF OPERATIONS

### *Energy Production*

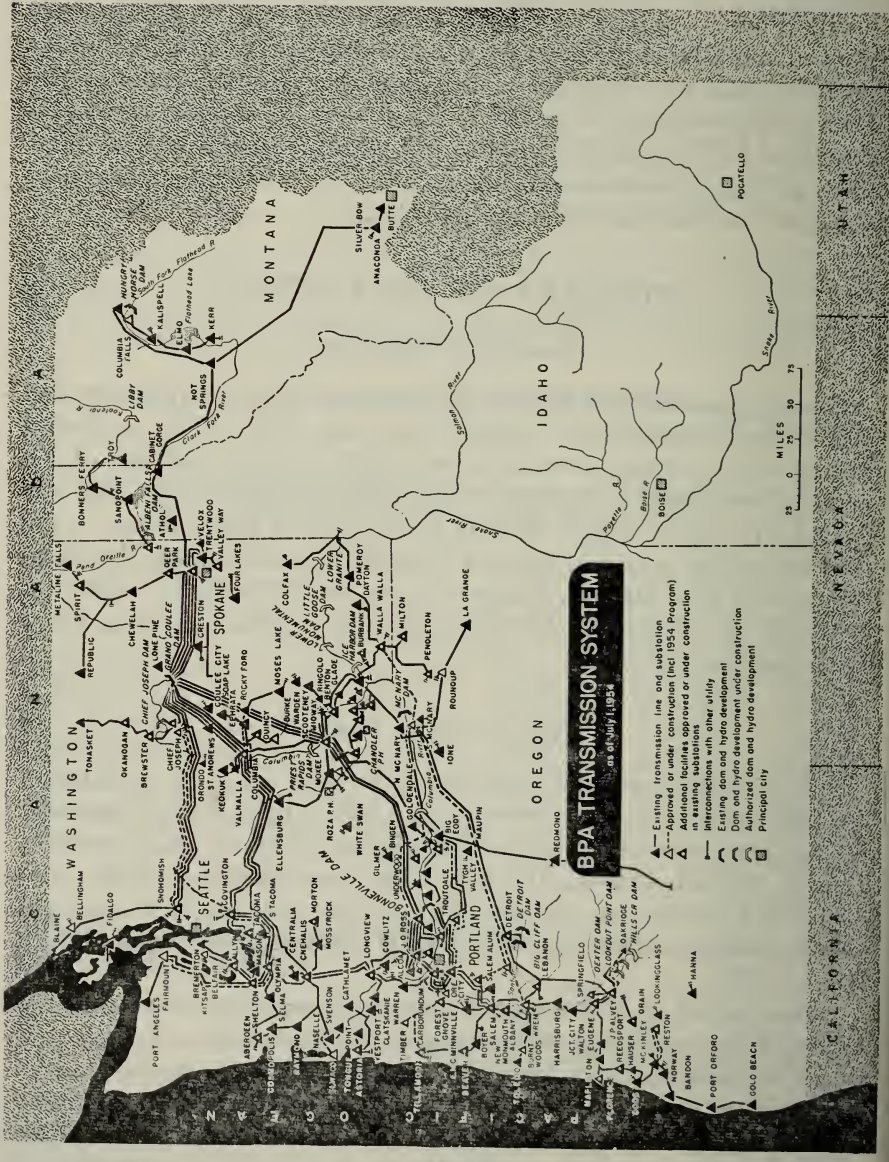
Energy generated at 6 Federal plants for the Administration totaled 20.2 billion kilowatt-hours during fiscal year 1954. This was an increase of 15 percent over fiscal year 1953 and an increase of 8.8 percent over fiscal year 1952. The marked increase over 1953 was caused by reduced stream flow in the Columbia River Basin in the first half of the year and resulted from addition of 9 units of generation at Big Cliff-Detroit, Hungry Horse, and McNary in fiscal year 1954 and the comparatively low stream flows in the Columbia River Basin the previous year.

### *New System Peak*

A new system peak was reached for the hour 5-6 p. m. on January 20, 1954, before the generator at Big Cliff and the fourth generator at McNary were in operation. Coincident demand on Bonneville, Detroit, Grand Coulee, Hungry Horse, and McNary plants was 3,301,000 kilowatts, an increase of 15 percent over the previous fiscal year's maximum demand of 2,867,000 kilowatts occurring during August 1952.

Since the fall of 1946 maximum system demands have continuously exceeded the nameplate rating of installed generators. Energy produced at Federal plants for the Administration is shown by years in table VI with peak demand and energy data in the accompanying chart. Prepared on a quarterly basis the chart on page 94 shows the general trends of the Bonneville Power Administration system-load growth and development.





**BPA TRANSMISSION SYSTEM**  
as of July 1954

- Existing transmission line and substation
- - - - - Approved or under construction (incl 1954 Program)
- ▲ Additional facilities approved or under construction in existing substations
- ▲ Interconnections with other utility
- ▲ Existing dam and hydro development
- ▲ Dam and hydro development under construction
- ▲ Authorized dam and hydro development
- Principal city

TABLE VI.—*Generation at Federal plants for Bonneville Power Administration, fiscal years 1939-54*

[Thousands of kilowatt-hours]

Fiscal years ending June 30—	Big Cliff generation	Bonneville generation	Detroit generation	Grand Coulee generation	Hungry Horse generation	McNary generation	Total generation for Bonneville Power Administration
1939.....	-----	34, 874	-----	-----	-----	-----	34, 874
1940.....	-----	208, 426	-----	-----	-----	-----	208, 426
1941.....	-----	894, 177	-----	7, 455	-----	-----	901, 632
1942.....	-----	1, 807, 309	-----	741, 844	-----	-----	2, 549, 153
1943.....	-----	2, 801, 480	-----	2, 816, 956	-----	-----	5, 618, 436
1944.....	-----	3, 488, 874	-----	5, 750, 949	-----	-----	9, 239, 823
1945.....	-----	3, 391, 127	-----	5, 660, 446	-----	-----	9, 051, 573
1946.....	-----	2, 674, 834	-----	3, 561, 329	-----	-----	6, 236, 163
1947.....	-----	3, 695, 255	-----	5, 058, 482	-----	-----	8, 753, 737
1948.....	-----	3, 991, 860	-----	<sup>1</sup> 6, 894, 047	-----	-----	10, 885, 907
1949.....	-----	3, 868, 558	-----	<sup>1</sup> 9, 057, 230	-----	-----	12, 925, 788
1950.....	-----	3, 689, 309	-----	<sup>1</sup> 10, 451, 524	-----	-----	14, 140, 833
1951.....	-----	3, 793, 276	-----	<sup>1</sup> 12, 679, 108	-----	-----	16, 472, 384
1952.....	-----	4, 462, 935	-----	<sup>1</sup> 14, 092, 466	-----	-----	18, 555, 401
1953.....	-----	4, 227, 463	<sup>2</sup> 2, 149	<sup>1</sup> 13, 277, 143	<sup>3</sup> 126, 477	-----	17, 633, 232
1954.....	8, 324	4, 406, 265	<sup>3</sup> 416, 372	<sup>1</sup> 13, 885, 832	682, 134	796, 906	20, 195, 833
Total.....	8, 324	47, 436, 022	418, 521	103, 934, 811	808, 611	796, 906	153, 403, 195

<sup>1</sup> Includes energy transferred for Bureau of Reclamation.<sup>2</sup> Includes energy for testing operations.<sup>3</sup> Does not include 7,466,000 kilowatt-hours for condensers at Detroit.TABLE VII.—*Electric energy account, fiscal year ended June 30, 1954*

Energy received (thousands of kilowatt hours) :

Energy generated for Bonneville Power Administration :

Big Cliff.....	8, 324
Bonneville.....	4, 406, 265
Detroit.....	<sup>1</sup> 416, 372
Grand Coulee.....	<sup>2</sup> 13, 885, 832
Hungry Horse.....	682, 134
McNary.....	796, 906
Total.....	20, 195, 833

Power purchased and interchanged in..... 2, 739, 695

Total received..... 22, 935, 528

Energy delivered (thousands of kilowatt-hours) :

Sales.....	18, 764, 627
Power interchanged out.....	2, 640, 274
Used by Administration.....	25, 231
Total delivered.....	21, 430, 132

Energy losses in transmission and transformation..... 1, 505, 396

Losses as percent of total energy received..... percent.. 6.6

Maximum demand on generating plants (kilowatts), January 20, 1954, 5-6 p. m., Pacific standard time..... 3, 301, 000

Load factor, total generated for Bonneville Power Administration..... percent.. 69.8

<sup>1</sup> Does not include 7,466,000 kw.-hr. for condensers at Detroit.<sup>2</sup> Includes 57,292,833 kw.-hr. transferred over BPA transmission facilities for Bureau of Reclamation.

### *Receipts and Deliveries*

Bonneville Power Administration's transmission grid forms the backbone of the interconnected transmission system of public and private utilities in the Pacific Northwest. As a result electric energy receipts and deliveries on Bonneville's transmission system cover many complex transactions in addition to receipts from Federal powerplants and deliveries by sales.

The integrated transmission grid makes possible the fullest utilization of power facilities in the area through diversity in peaking and water capabilities and diversity of system-load conditions. Substantial quantities of energy are received and delivered as transfers from other utilities.

Transactions also involve storage by the Administration in non-Federal reservoirs as well as storage by non-Federal utilities in the Grand Coulee Reservoir. Disposition of energy includes deliveries from storage in Grand Coulee or to storage in other reservoirs, energy transfers for the Bureau of Reclamation from Grand Coulee, energy used by the Administration and energy losses in transmission and transformation.

Table VII, electric energy account, summarizes energy receipts and deliveries for fiscal year 1954.

### *Sales of 18.8 Billion Kilowatt-Hours*

Energy sales to customers of the Bonneville Power Administration totaled 18.8 billion kilowatt-hours during fiscal year 1954, an increase of 14.5 percent over the previous year.

Sales of electric energy to other utilities, both publicly and privately owned, totaled 8.1 billion kilowatt-hours, an increase of 9.5 percent over the previous fiscal year. Deliveries to industrial plants and Federal agencies totaled 10.1 billion kilowatt-hours, an increase of 19.1 percent.

With better than minimum water flow in the Columbia during the first 6 months of the year and favorable water conditions during the last 6 months it was possible to deliver almost 3 billion kilowatt-hours of interruptible energy to industrial customers. This was an increase of 6.6 percent over the 1953 fiscal year when unfavorable water conditions cut off interruptible deliveries during 4 months of the year.

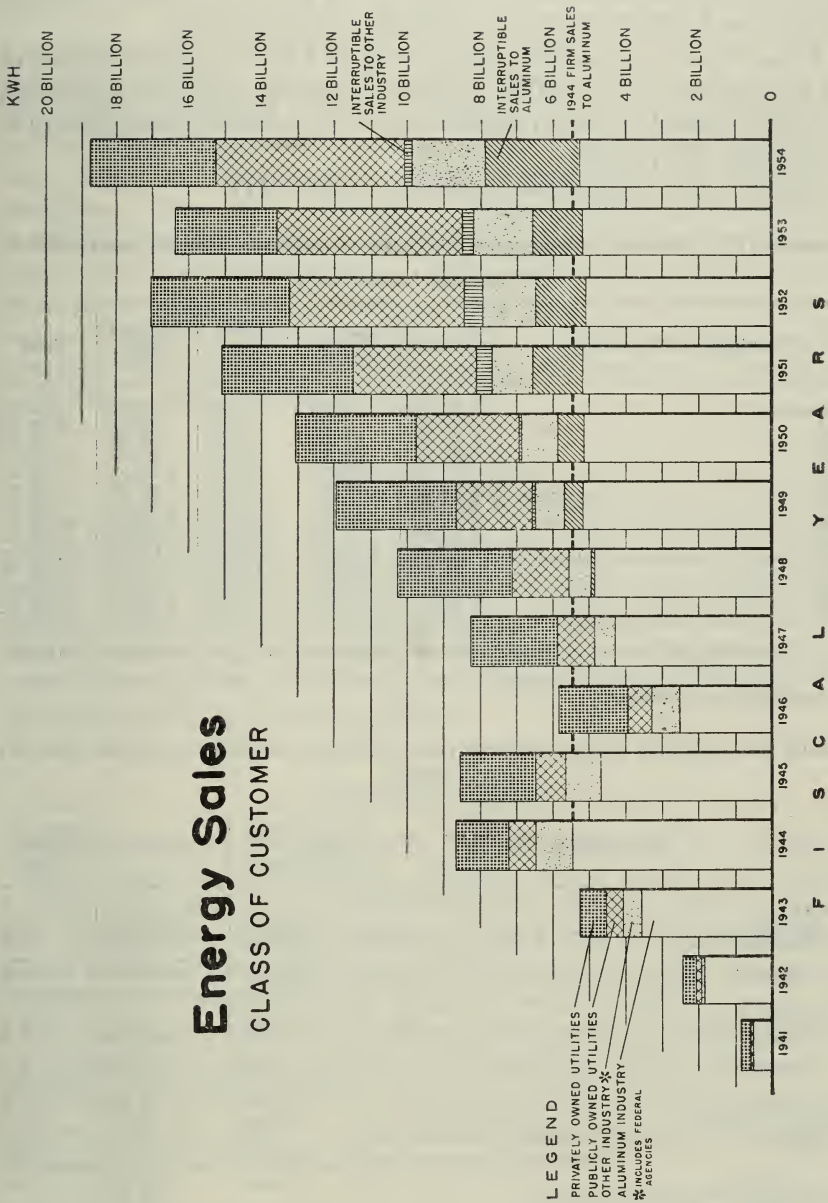
### *Composite Average Rate of 2.40 Mills*

The Administration has delivered 142,617,635,000 kilowatt-hours of energy at a composite average rate of 2.40 mills per kilowatt-hour during the 16 years of operation ending June 30, 1954. Sales to pub-



# Energy Sales

## CLASS OF CUSTOMER



licly owned utilities for this period were 28.8 billion kilowatt-hours at an average of 2.81 mills. Privately owned utilities received 32.8 billion kilowatt-hours at an average rate of 2.34 mills, and industries 80.9 billion kilowatt-hours at an average rate of 2.27 mills.

Power sales to aluminum plants were 66.7 billion kilowatt-hours at an average rate of 2.17 mills. Sales to industries other than aluminum including sales to Federal agencies were 14.2 billion kilowatt-hours at an average of 2.76 mills.

Sales by class of customer are shown in table VIII.

TABLE VIII.—*Electric energy sales by class of customer—fiscal years 1939–54*  
[Thousands of kilowatt-hours]

Fiscal years ending June 30	Aluminum	Other industries <sup>1</sup>	Publicly owned utilities	Privately owned utilities	Total
1941 and prior.....	522,982	4,829	35,242	536,555	1,099,608
1942.....	1,845,249	79,155	142,491	357,704	2,424,599
1943.....	3,588,848	507,196	435,289	739,076	5,270,409
1944.....	5,453,893	1,022,477	727,642	1,467,304	8,671,316
1945.....	4,667,381	964,724	823,822	2,057,203	8,513,130
1946.....	2,492,985	799,378	635,531	1,902,990	5,830,884
1947.....	4,212,413	626,688	1,044,784	2,377,887	8,261,772
1948.....	4,902,465	646,913	1,560,754	3,180,993	10,291,125
1949.....	5,665,746	881,454	2,080,833	3,343,091	11,971,124
1950.....	5,863,465	1,023,830	2,839,913	3,311,972	13,039,180
1951.....	6,544,702	1,537,580	3,414,245	3,578,212	15,074,739
1952.....	6,471,694	1,943,241	4,803,210	3,793,699	17,011,844
1953.....	6,546,677	1,947,129	5,110,297	2,789,175	16,393,278
1954.....	7,862,085	2,253,331	5,127,298	3,521,913	18,764,627
Total to July 1, 1954.....	66,640,585	14,237,925	28,781,351	32,957,774	142,617,635

<sup>1</sup> Includes Federal agencies.

TABLE IX.—*Electric energy sales by rate schedules—fiscal year ending June 30, 1954*

Rate schedule	Energy (thousands of kilowatt-hours)	Revenue	Mills per kilowatt-hour
C-3, C-4:			
Industries.....	9,846,648	\$20,570,066	2.09
Utilities.....	4,660,869	10,426,739	2.24
Subtotal.....	14,507,517	30,996,805	2.14
F-2, F-3, F-4:			
Industries.....	18,171	111,262	6.12
Utilities.....	61,470	281,881	4.59
Subtotal.....	79,641	393,143	4.94
A-4: Utilities.....	16,893	55,558	3.29
E-3, E-4: Utilities <sup>1</sup> .....	3,201,969	10,150,067	3.17
Experimental, H-2, H-3 and exchange: Industries and utilities.....	958,607	2,396,517	2.50
Total sales.....	18,764,627	43,992,090	2.34
Reconciliation with accounting records.....		+135,319	
Other electric revenues.....		1,089,244	
Total operating revenues.....		45,216,653	

<sup>1</sup> Including Federal agency pumping service.

### *Rate Schedules*

More than three-fourths of the energy sales for the year were made under the C-4 wholesale rate schedule at an average rate of 2.14 mills per kilowatt-hour. This is the kilowatt-year rate for firm power delivered anywhere from the transmission system and is also used with special measured demand provisions for sales of interruptible power. Sales are generally made under this rate to industries operating at high load factor and to utilities having substantial generating facilities. Other sales were made principally under the E schedule to utilities purchasing all or substantially all of their power requirements from the Administration. Sales under the F schedule were made to the utilities and industries requiring power at low-load factor use and under the H schedule for dump, exchange, or experimental purposes. A summary of energy sales for the fiscal year 1950 classified by rate schedules is shown in table IX.

### *Customers Served*

The Administration was serving 114 customers at the end of fiscal year 1954. There were 78 publicly owned distributors of power, 17 industrial customers, 12 Federal agencies and 7 privately owned utilities. There were three customer changes during the year: Hanna Nickel Smelting Co. was added, the United States Engineer Corps discontinued service at McNary, and Mountain States Power Co. merged with Pacific Power & Light Co.

### *Generation Added*

Additions to the Federal system in fiscal year 1954 have a nameplate rating of 540,500 kilowatts. Hungry Horse project units 3 and 4 with a combined rating of 142,500 kilowatts were brought into operation by the Bureau of Reclamation. The Corps of Engineers completed Detroit Dam on the North Santiam River in Oregon with initial operation of two generators having a total nameplate rating of 100,000 kilowatts. The Big Cliff reregulating dam downstream with an 18,000-kilowatt generator was also completed, permitting peaking operations to start at Detroit in November 1953. The first four generators, with combined rating of 280,000 kilowatts, were placed in service by the Corps of Engineers at McNary Dam.

### *Projects Summarized*

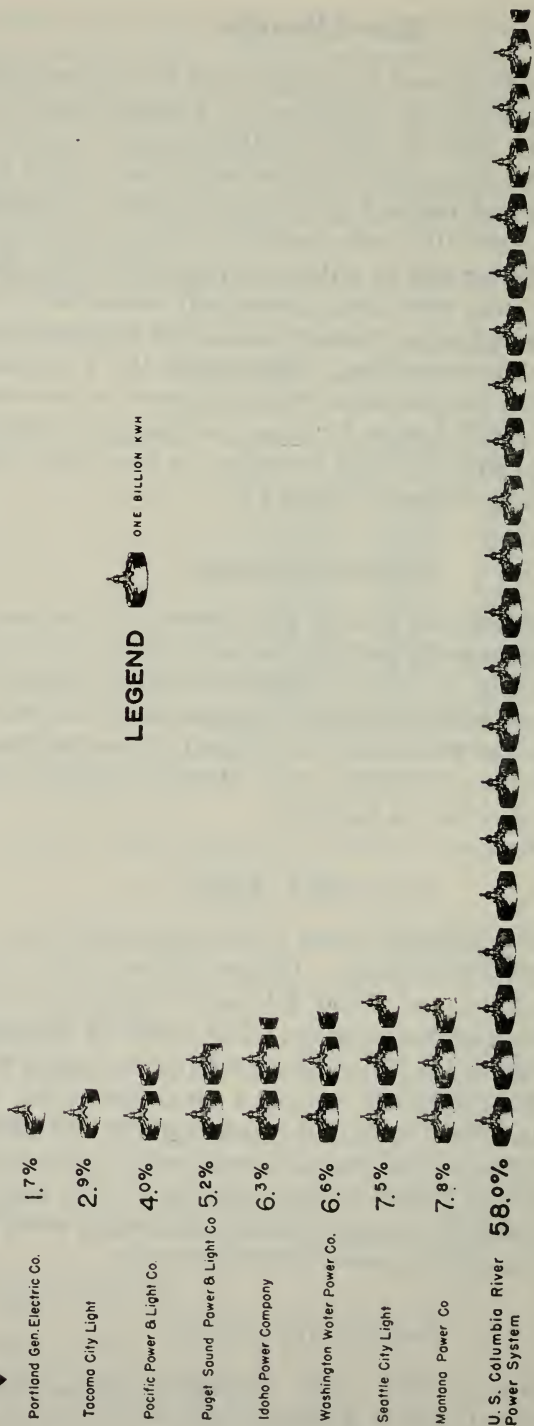
Federal projects existing, under construction, and authorized for construction by the Corps of Engineers and the Bureau of Reclamation are shown in table X. With all these projects operating as a sys-



**Power Generated** BY THE PRINCIPAL ELECTRIC UTILITIES OF THE PACIFIC NORTHWEST

YEAR ENDED JUNE 30, 1954

GENERATED BY



**LEGEND**  ONE BILLION KWH

**TOTAL 34.8 BILLION KWH**

THE ABOVE UTILITIES ARE MEMBERS OF THE NORTHWEST POWER POOL. UTAH POWER & LIGHT CO. AND BRITISH COLUMBIA ELECTRIC CO. ARE ALSO POOL MEMBERS BUT ARE NOT INCLUDED IN THIS CHART BECAUSE THEIR MAJOR SERVICE AREAS LIE OUTSIDE THE PACIFIC NORTHWEST REGION.

SOURCE: WEEKLY OPERATING REPORTS OF N. W. POWER POOL

tem, existing generating capacity, excluding the 10 McNary units not yet in operation, would provide 2,637,000 average kilowatts of nominal prime power. Generating capacity under construction including the 10 McNary units would provide an additional 1,815,000 kilowatts, and authorized projects would add 2,259,000 kilowatts.

Existing storage capacity including Albeni Falls Reservoir is 9,532,000 acre-feet. An additional 336,000 acre-feet will be provided by Lookout Point Reservoir now under construction and 5,805,000 acre-feet by currently authorized projects.

All contemplated generation and storage capacity for the projects under construction will be in service by November 1961 under present schedules. Service dates for the authorized projects are not scheduled as no funds are appropriated for their construction. Upon completion, all these multipurpose projects would provide a total of 15.7 million acre-feet of usable storage and 6.7 million kilowatts of prime power.

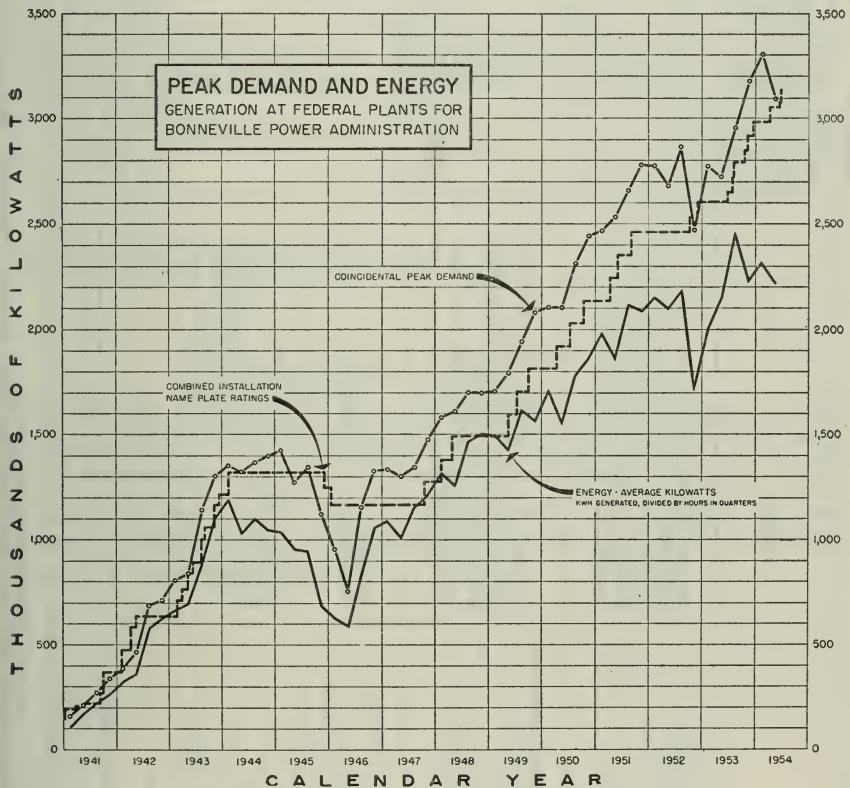


TABLE X.—General specifications—Existing and authorized projects. Installations and capabilities correspond to a coordinated system of operation

Existing projects:	Location	Stream	Plant installations		Nominal prime power kilowatts <sup>2</sup>	Pool elevation (feet)	Usable storage (acre-feet)	Average head (feet)	Initial date in service	Principal purpose <sup>3</sup>
			Number of units	Total capacity watts <sup>1</sup>						
Bonneville.....	Washington-Oregon	Columbia	10	518,400	458,000	72.0		59	June 1938	P, N.
Grand Coulee.....	Washington	do	18	1,944,000	1,288.0	1,288.0	5,072,000	326	September 1941	P, I, F, C, N.
Hungry Horse.....	Montana	South Fork Flathead	4	285,000	187,000	3,560.0	2,982,000	364	October 1952	P, I, F, C, N.
Detroit.....	Oregon	North Santiam	2	100,000	99,000	1,569.0	323,000	299	July 1953	P, I, F, C, N.
McWary.....	Washington-Oregon	Columbia	14	980,000	583,000	340.0		83	November 1953	P, I, N.
Big Cliff.....	Oregon	North Santiam	1	18,000	10,000	1,206.0		91	June 1954	P.
Total.....				3,845,400	2,898,000		8,377,000			
Projects under construction:										
Lookout Point.....	Oregon	Middle Fork Willamette	3	114,000	36,000	929.0	336,000	228	December 1954	P, I, F, C, N.
Albani Falls.....	Idaho	Pend Oreille	3	42,600	29,000	2,062.5	1,155,000	24	January 1955	P, F, C, N.
Dexter.....	Oregon	Middle Fork Willamette	1	15,000	12,000	685.0		53	April 1955	P.
Chandler.....	Washington	Yakima	2	12,000	11,000	620.0		118	September 1955	P, I.
Chief Joseph.....	do	Columbia	16	1,024,000	815,000	946.0		169	do	P, I.
The Dalles.....	Washington-Oregon	do	16	1,119,000	651,000	160.0		87	November 1957	P, N.
Total.....				2,326,600	1,554,000		1,491,000			
Authorized projects:										
Libby.....	Montana	Kootenai	6	600,000	264,000	2,459.0	5,010,000	267		P, F, C, N.
Ice Harbor.....	Washington	Snake	3	195,000	137,000	440.0		97		P, I, N.
Lower Monumental.....	do	do	3	180,000	130,000	533.0		92		P, N.
Little Goose.....	do	do	3	188,000	139,000	633.0		90		P, N.
Lower Granite.....	do	do	3	165,000	114,000	718.0		80		P, N.
Priest Rapids.....	do	Columbia	18	994,000	735,000	650.0	(9)	146		P, F, C, N.
John Day.....	Washington-Oregon	do	13	1,105,000	675,000	255.0	(9)	94		P, I, F, C, N.
Roza.....	Washington	Yakima	2	11,250	6,000	1,230.6		140		P, I, F, C, N.
Hills Creek.....	Oregon	Middle Fork Willamette	1	30,000	14,000	1,543.0	291,000	220		P, I, F, C, N.
Cougar.....	do	South Fork McKenzie	2	25,000	14,000	1,683.0	182,000	418		P, I, F, C, N.
Green Peter.....	do	Middle Santiam	1	15,000	22,000	984.0	322,000	315		P, I, F, C, N.
White Bridge.....	do	do	1	15,000	9,000	670.0		93		P.
Total.....				3,556,250	2,259,000		5,805,000			
Total (24 projects)				9,728,250	6,683,000		15,673,000			

<sup>1</sup> Nameplate rating.  
<sup>2</sup> Average capability during an 8-month storage release period (September 1936 through April 1937).  
<sup>3</sup> P-Power; I-Irrigation; F-C-Flood control; N-Navigation.  
<sup>4</sup> Legislation is under consideration providing for non-Federal financing of these projects.  
<sup>5</sup> Authorization provides for flood control storage of 2,100,000 acre-feet at Priest Rapids and 2,000,000 acre-feet at John Day.  
<sup>6</sup> Power facilities are not authorized.  
<sup>7</sup> White Bridge is not authorized but is required for regulating purposes with installation of generating units at Green Peter.  
<sup>8</sup> Pumping requirements of 28,000 average kilowatts for 450,000 acres of the Columbia Basin project.



*Non-Federal Additions*

Additions to generating facilities of non-Federal utilities in the area served by the administration for fiscal year 1954, have a nameplate rating of 249,200 kilowatts. A 90,000-kilowatt unit was installed at the Ross plant of the city of Seattle, and the final 50,000-kilowatt unit was installed at the Cabinet Gorge plant of Washington Water Power Co. Reconstruction of the Portland General Electric Co.'s Sullivan plant was completed with installation of the last 1,200-kilowatt unit. Yale project with rating of 108,000 kilowatts was completed on the Lewis River by Pacific Power & Light Co. Future additions presently scheduled by non-Federal utilities in this area are shown in table XI.

TABLE XI.—*Non-Federal utilities—generator installation schedule, July 20, 1954*

Utility and plant	Stream	Unit No.	Nameplate rating (thousands of kilowatts)	Date in service
Pend Oreille County public utility district: Box Canyon	Pend Oreille	{ 2	15	August 1954.
		{ 3	15	October 1954.
		{ 4	15	November 1954.
Portland General Electric Co.:				
Oak Grove (Frog Lake forebay).....	Clackamas		(1)	August 1954.
Timothy Meadows Reservoir (60,000 acre-feet of usable storage).....	do		(2)	October 1955.
Montana Power Co.: Kerr.....	Flathead	3	56	November 1954.
City of Tacoma: Steam plant No. 2.....		2	25	December 1954.
City of Centralia: Yelm.....	Nisqually	3	5	December 1954.
City of Seattle:				
Ross.....	Skagit	4	90	July 1957.
Gorge.....	do	(3)	(3)	July 1957.

<sup>1</sup> Will add 18,000 kilowatts of peaking capacity.

<sup>2</sup> Will add 10,000 kilowatts of prime power at downstream plants.

<sup>3</sup> Increased height of dam. Will increase gross head by 88 feet and peaking capability by 47,000 kilowatts.

*Northwest Power Pool*

Generation during fiscal year 1954 by the principal electric utility systems of the Pacific Northwest is shown in table XII. All of the utilities are members of the Northwest Power Pool. The Utah Power & Light Co. and the British Columbia Electric Co. are also members of the pool but are not included as their major service areas are outside the Pacific Northwest region.

**Northwest Power Pool** NET OPERATIONS YEAR ENDING JUNE 30, 1954  
 BPA SUPPLIED 85% OF NET ENERGY REQUIREMENTS OF POWER POOL UTILITIES

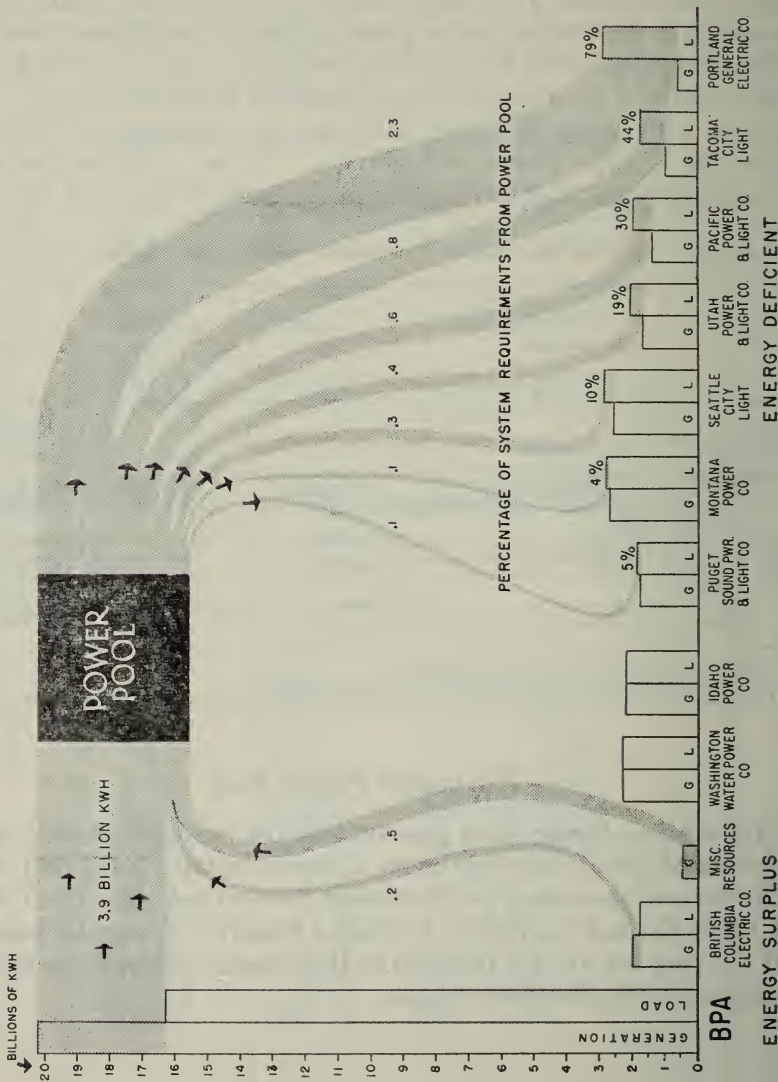
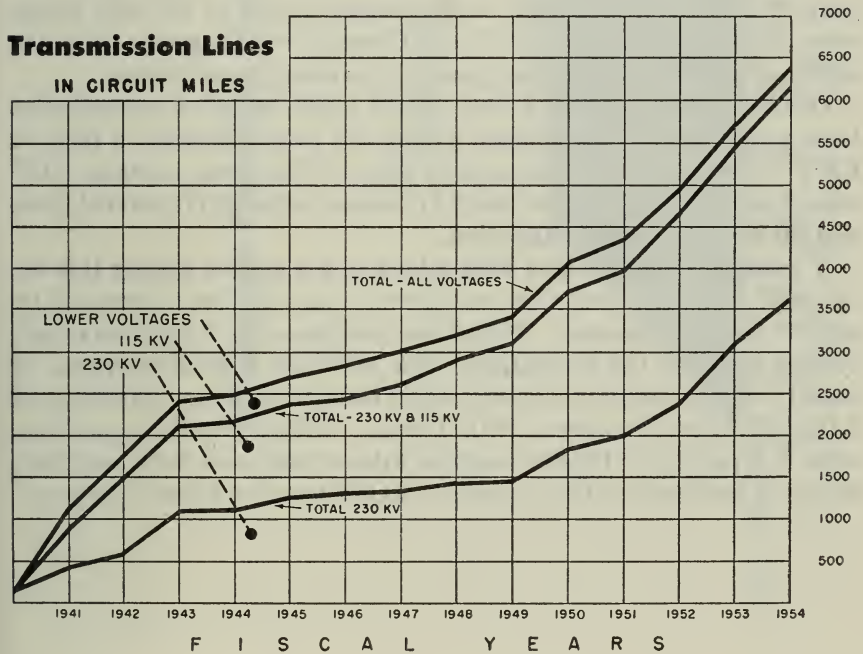


TABLE XII.—Generation by the principal electric utility systems of the Pacific Northwest, fiscal year 1954

Utilities	Kilowatt-hours	Percent of total generation
<b>Publicly owned:</b>	<i>Billions</i>	<i>Percent</i>
Bonneville Power Administration.....	20.2	58.0
Seattle City Light.....	2.6	7.5
Tacoma City Light.....	1.0	2.9
<b>Total publicly owned.....</b>	<b>23.8</b>	<b>68.4</b>
<b>Privately owned:</b>		
Puget Sound Power & Light Co.....	1.8	5.2
Washington Water Power Co.....	2.3	6.6
Pacific Power & Light Co.....	1.4	4.0
Portland General Electric Co.....	.6	1.7
Montana Power Co.....	2.7	7.8
Idaho Power Co.....	2.2	6.3
<b>Total privately owned.....</b>	<b>11.0</b>	<b>31.6</b>
<b>Total generation <sup>1</sup>.....</b>	<b>34.8</b>	<b>100.0</b>

<sup>1</sup> The above utilities are members of the Northwest power pool. Utah Power & Light Co. and British Columbia Electric Co. are also members of the pool, but are not included above because their major service areas lie outside the Pacific Northwest region.

The Administration supplied 58 percent of the total energy generated by the major utilities of the region. In addition to the power requirements of industries and nonpool utilities served by the Administration approximately 3.9 billion kilowatt-hours of energy was provided for use by other pool utilities to meet their requirements.





*Transmission System Additions*

A new 96-mile, 230,000 volt transmission line from McNary Dam to the Big Eddy, Oreg., substation was energized in November 1953, providing the transmission facility necessary to integrate the initial power production from McNary Dam with the Bonneville Power Administration system. In December 1953 an additional 77-mile, 230,000 volt line, from Big Eddy to the Troutdale, Oreg., substation was energized, carrying McNary power to the Portland load center. To transmit the power from additional generating units placed in service at McNary Dam the 104-mile, McNary-Maupin 230,000 volt line was energized in June 1954. This line connected to the previously existing circuit from Maupin to the Alvey substation brings McNary generation to the Willamette Valley load center.

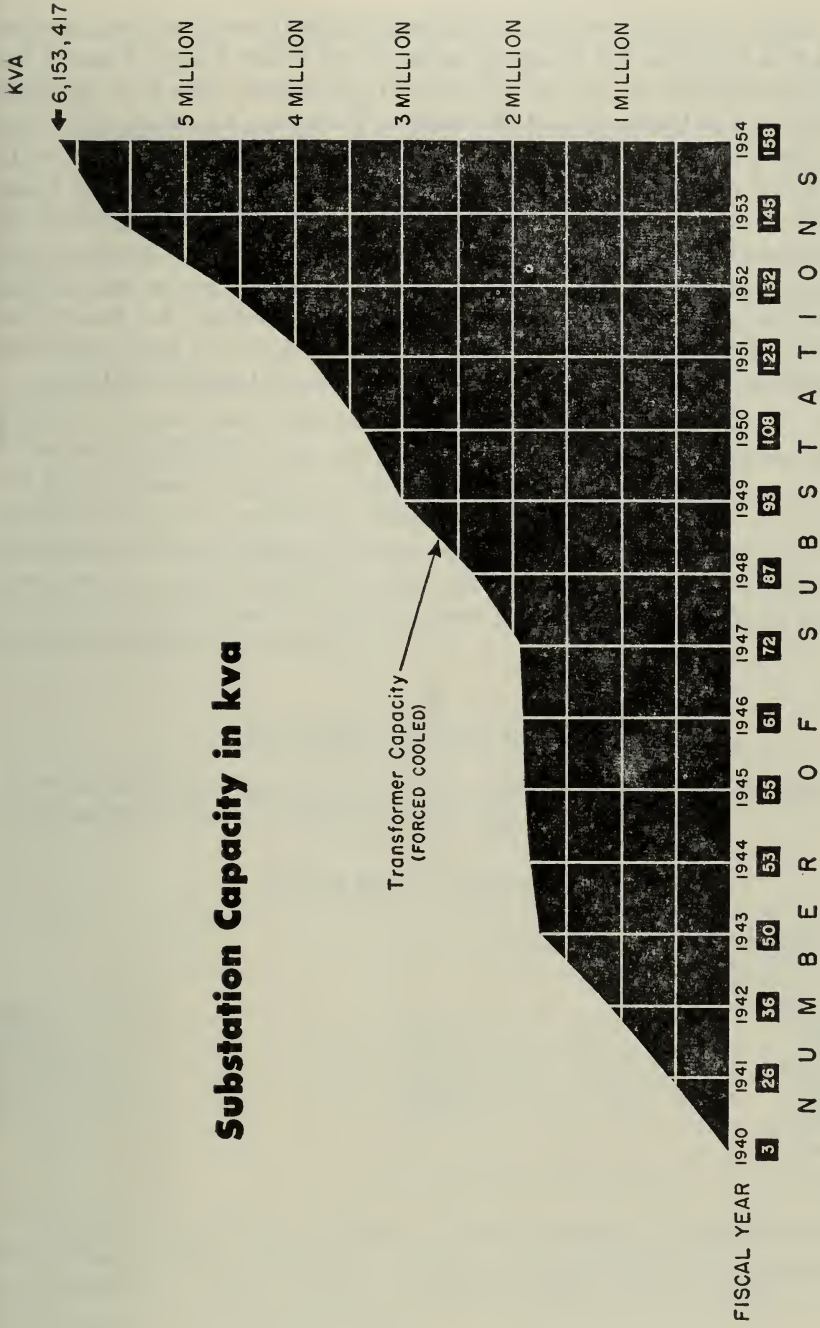
Energization of the 155-mile, Columbia-Olympia transmission line at 230,000 volts provided additional transmission capacity to the Puget Sound area. This line is connected to an existing Grand Coulee-Columbia line, providing a through circuit from Grand Coulee to Olympia. Installation was started during the year of terminal facilities at Grand Coulee and Olympia to raise the operating voltage of this line to 287,000 volts.

Twelve new customer service substations, ranging in capacity from 3,000 to 150,000 kilovolt-amperes, were energized during this fiscal year. Transformer capacity was increased at the G. H. Bell, Longview, Walla Walla, Redmond, and Grandview substations with the addition of forced cooling equipment to existing transformers.

During fiscal year 1954 a total of 670 circuit miles of transmission lines were added to the system, giving the Administration a total of 6,377 circuit miles of transmission lines. This total includes 3,627 circuit miles of 230,000 volt line, 2,517 circuit miles of 115,000 volt line, and 233 miles of lower voltage line.

A total of 13 substations were added to the system during this fiscal year, and the substation transformer capacity was increased by 444,333 kilovolt-amperes. With these additions the Administration's system includes 158 substations with 4,609,750 kilovolt-amperes of transformer capacity under self cooled conditions, and a maximum of 6,153,417 kilovolt-amperes with forced cooling. Static capacitors, with a capacity of 132,350 reactive kilovolt-amperes were installed, bringing the total on the system to 991,865 reactive kilovolt-amperes.

# Substation Capacity in kva



N U M B E R O F S U B S T A T I O N S

*New Construction*

Major construction activity during the fiscal year was concentrated on the facilities for bringing power from Chief Joseph Dam to the Puget Sound area, and on additional transmission lines from McNary Dam to the Portland and Willamette Valley load centers. To bring initial power from Lookout Point Dam into the Bonneville system in the fall of 1954, a 115,000 volt transmission line from Lookout Point Dam to the J. P. Alvey substation was constructed. Installation of microwave communication facilities from Portland to Spokane and from Portland to the J. P. Alvey substation were under way during the year, with completion of the facilities scheduled for the fall of 1954. Construction was started in May 1954 on the new power dispatching center in the Portland Department of Interior Building.



# Southwestern Power Administration

Douglas G. Wright, *Administrator*



FOR the fiscal year 1954 Southwestern Power Administration received \$1,600,000 in appropriations for carrying on its operation and maintenance program. Also, previously appropriated funds for construction in the amount of \$2,420,000 remained available for the completion of the Administration's construction program. Expenditures not to exceed \$1,200,000 were authorized from the continuing fund for the purchase of electric power and energy, and rentals for the use of transmission facilities.

## POWER RESOURCES

The installed generating capacity in powerplants at these projects as of June 30, is shown in the following table:

### *Existing power installations*

Project	River basin	Installed capacity
		<i>Kilowatts</i>
Denison.....	Red.....	70,000
Norfolk.....	White.....	70,000
Narrows.....	Ouachita (Red).....	17,000
Bull Shoals.....	White.....	160,000
Fort Gibson.....	Grand (Neosho).....	45,000
Tenkiller Ferry.....	Illinois.....	34,000
Whitney.....	Brazos.....	30,000
Total.....	.....	426,000

This capacity of 426,000 kilowatts will be augmented by 75,000 kilowatts when Blakely Mountain project on the Ouachita River comes into production, approximately January 1, 1955, thus increasing installed capacity to 501,000 kilowatts.

## ENERGY PRODUCTION

Adverse water conditions prevailed throughout the fiscal year in the SPA area as the most severe period of low stream flow ever experienced continues. Denison Reservoir is the only hydro project showing near normal inflow for the year and this was only made possible by the high inflows of May 1954. As shown in the following table, four of the five reservoirs of the interconnected system have experienced extremely low inflow this year. At the end of the fiscal year, these four reservoirs were entering their 27th consecutive month of low flow with the total volume of flow less than two-thirds the flow of any former period of comparable length.

Project :	Percent of normal
Bull Shoals.....	17
Norfolk.....	38
Tenkiller Ferry.....	36
Fort Gibson.....	17
Denison.....	98
Narrows.....	56
Whitney.....	58

During the first half of the fiscal year the Denison Reservoir water level was very low. Energy was carried over SPA's interconnecting transmission system from Bull Shoals and Norfolk plants to assist Denison plant in carrying its normal load. The condition reversed itself the last half of the year as water became available at Denison. Denison plant in carrying its normal load. This condition reversed the load on Bull Shoals and Norfolk. The interconnecting transmission system is enabling SPA to make maximum use of water available.

Net generation within the Southwestern Power Administration area during the 1954 fiscal year was 780,612,340 kilowatt-hours. Of this, 742,679,900 kilowatt-hours was on the interconnected system. The net generation from each project is given below :

Project :	Kilowatt-hours
Bull Shoals.....	334, 661, 000
Norfolk.....	132, 752, 800
Tenkiller Ferry <sup>1</sup> .....	43, 337, 900
Fort Gibson.....	39, 497, 200
Denison.....	192, 431, 000
Subtotal (interconnected system).....	742, 679, 000
Narrows.....	17, 774, 010
Whitney.....	20, 158, 430
Subtotal (isolated plants).....	37, 932, 440
Total.....	780, 612, 340

<sup>1</sup> Commenced commercial operation in November 1953.

## ENERGY DELIVERIES

Southwestern Power Administration delivered power and energy to preferred customers directly over its lines and through the facilities of the Texas Power & Light Co., the Southwestern Gas & Electric Co., the Public Service Co. of Oklahoma, the Oklahoma Gas & Electric Co., the Central Electric Power Cooperative, the Western Farmers Electric Cooperative, the M & A Electric Power Cooperative, and the N. W. Electric Power Cooperative.

During the year, electric service was initiated to six new preferred customers. These include 3 military installations in Oklahoma with a total contract demand of 4,800 kilowatts, 2 municipalities in Missouri with a total contract demand of 4,000 kilowatts, and 1 federated cooperative in Missouri to which the Government has a maximum contractual obligation of 20,000 kilowatts. Also, eight additional delivery points were provided for existing preferred customers. In addition, service began to the Arkansas Power & Light Co. under a triparty agreement whereby 150,000 kilowatt capacity supplied by SPA supplements the Arkansas Power & Light Co. in its service to the Reynolds Metals Co., a defense industry in Arkansas.

Contracts with 18 rural electric cooperatives were amended to increase contract demands by a total of 6,100 kilowatts. Contracts with 8 municipalities were amended to increase contract demands by a total of 10,540 kilowatts, and contracts with 2 military installations were amended to increase contract demands by a total of 800 kilowatts.

At the end of fiscal year 1954, the sum of obligations to and contract demands of all preferred customers served by SPA amounted to 187,360 kilowatts, comprised of the following:

	<i>Kilowatts</i>
Rural electric distribution cooperatives (contract demands)-----	29, 970
Federated cooperatives (maximum contract obligations)-----	119, 350
Military installations (contract demands)-----	9, 900
Municipalities (contract demands)-----	28, 140

During the fiscal year 457,646,699 kilowatt-hours of electric energy were sold to preferred customers; equivalent to 62.5 percent of the total of 732,774,813 kilowatt-hours hydroelectric energy marketed by this Administration. In addition, purchases of thermal electric energy for integration with hydroelectric energy, and energy received through interchange, amounted to 89,371,229 kilowatt-hours; therefore, the total energy marketed was 822,146,042 kilowatt-hours, of which 55.7 percent was sold to preferred customers.

Revenue from sales by this administration during the fiscal year amounted to \$4,711,999. This amount included sales to preferred customers of \$2,450,490, and sales to private utility companies of \$2,261,510.



By the end of the fiscal year, wholesale power and energy generated by the hydroelectric facilities under the marketing jurisdiction of SPA were being sold to 16 distribution cooperatives, 19 municipalities, 5 private utilities, 5 United States military installations, and 6 federated cooperatives.

## CONTRACT NEGOTIATIONS

A contract is being negotiated with the Brazos Electric Power Cooperative under which it is proposed that the cooperative will receive the entire output of the Whitney Dam project, an isolated project on the Brazos River in Texas.

A contract is being negotiated with the Arkansas Power & Light Co. under which it is proposed that the company will make power and energy available to the Government from the system of the company in return for the entire output of the Blakely Mountain Dam project, an isolated project in Arkansas.

The agreements this administration had with certain wholesale power cooperatives for leasing their transmission facilities, and for the purchase and sale of electric power and energy were made inactive by the action of Congress on Southwestern Power Administration's request for appropriations for the 1954 fiscal year. As a result, long-term contracts are now being negotiated for the sale of hydroelectric power and energy to wholesale power cooperatives in Missouri, which contracts involve the integration of the systems of the cooperatives with certain Missouri power companies.

## PERSONNEL

Personnel activities have been controlled by the progression of the organizational study initiated by the Department in November 1953 and resulting in the authorization and direction to schedule and effect the organization recommended by the survey team. Except for routine functioning and essential personnel programs, specific actions have been limited to three phases of work:

1. Planning and carrying out a reduction in force program which reduced employment in the Administration by 28 percent;
2. Making studies to determine the essential tasks required to perform the functions established for the new organization and assignment of these tasks to positions; and
3. Analysis, evaluation and classification of new positions.

Total employment in the Administration at the close of the 1954 fiscal year was 154 full-time employees. Of these employees, 108 are serving under permanent or probational appointments, 40 under

indefinite appointments, 1 under temporary limited appointment, and 5 under excepted appointments. Sixty-nine employees have veteran's preference, including 66 men and 3 women. Thirty-five employees are under the benefits of the Social Security Act and 119 have retirement act benefits.

## SUPPLY AND PROCUREMENT

Contract administration and procurement were confined mostly to completion of construction contracts in progress, minor substation installations, and various specialized items of transformers, communications and protective equipment along with routine operational and service needs. Major supply activities consisted of the determination of supply requirements of the Administration operating under the plan of the reorganization and disposition of excess and surplus property. During the year stores and equipment were reduced by 35 percent.

## ARKANSAS-WHITE-RED BASINS INTERAGENCY COMMITTEE

Representatives of the Southwestern Power Administration participated during the year with officials of other departments, bureaus, agencies, and States in plans and studies for the development of the land and water resources of the Arkansas, White, and Red River Basins.

Representatives of SPA participated in the activities of the various subcommittees and work groups; directed the activities of the transmission line subgroup of the hydroelectric power work group; and represented the Department on the water use and control task groups responsible for preparing overall tentative basin plans for navigation, flood control, hydroelectric power, irrigation, drainage, and domestic and industrial water supply. Through its representation on the southwest field committee, this Administration is participating in the formulation of definite plans and methods for future resource development to activate the recommendations of the final report.

## OPERATION AND MAINTENANCE

No change in the mileage of transmission lines operated and maintained by SPA occurred in fiscal year 1954. Present mileage is: 558.7 of 161-kilovolts, 256.1 of 138-kilovolts, and 188.6 of 69-kilovolts, or a total of 1003.4 miles of high voltage transmission lines.

Of the five substations and switching stations reported under con-

struction and scheduled for completion in 1954, Springfield and Carthage, Mo., are completed and in service. Clinton, Mo., is substantially completed but not energized, and installation of system communications for these stations is nearing completion. Anadarko and Tupelo, Okla., are being operated but some equipment is yet to be received and installed.

Establishment of a system operations center at Springfield, Mo., and employment of system operators (dispatchers) were started in May, fiscal year of 1953, and full operation around the clock was started May 12, 1954.

Operation and maintenance of cooperatives' facilities by SPA were discontinued in July 1953, in accordance with congressional action on appropriations. SPA, the cooperatives, and the companies have been actively negotiating integration and long term contracts. In the meantime, interim contracts between SPA and the cooperatives are being used.

## LITIGATION

In *Kansas City Power & Light Company et al. v. McKay* (substituted) *et al.* (115 F. Supp. 402), the District Court of the District of Columbia upheld the validity of numerous complicated contracts between Southwestern Power Administration and various rural electric cooperatives in Missouri. The plaintiffs have appealed from the final judgment entered in the case. At the close of the fiscal year their appeal was pending before the Court of Appeals, District of Columbia Circuit.

In *United States v. Arkansas Power & Light Company*. This was an action by the Government against the power company to recover damages for alleged breach of contract. The contract pertained to the sale and delivery to the power company of electrical energy generated by the Government's Norfolk Dam project in Arkansas. The district court entered judgment of dismissal, upon the merits, and the Government appealed. The Court of Appeals (8 Circ.) affirmed the judgment of dismissal (207 F. 2d 943).

In *Central Electric Power Cooperative v. McKay et al.* (D. C. unreported), a suit for declaratory judgment, the District Court for the District of Columbia rendered judgment for the plaintiff. The Interior Department Appropriation Act, 1954, provided for the use of a continuing fund in making purchases of electric power and energy and in making payments of rentals for use of transmission facilities. The court held that the fund is available to carry out a power purchase contract and a transmission line rental contract which the plaintiff had with the Government. At the close of the fiscal year, the cause was pending on the defendant's notice of appeal to the Court of Appeals, District of Columbia Circuit.



# Southeastern Power Administration

Charles W. Leavy, *Administrator*



THE Congress appropriated a total of \$1,268,000 for the agency to carry out all activities during the fiscal year. The appropriation in the regular Department appropriation bill for the year was divided into a \$261,000 allowance for agency operation and maintenance, a \$50,000 allowance for advance planning, and a \$819,000 allowance for the purchase of firming energy and payment of wheeling fees. Because this latter allowance was based on the expectation of favorable water conditions which did not materialize at the John H. Kerr project, it was necessary to seek supplemental funds for the purchase of firming energy. Accordingly, \$138,000 was appropriated by the Congress for this purpose in the third supplemental appropriation bill for 1954.

Fifty persons were employed by the agency at the beginning of the year. The year was concluded with a total working force of 45 employees assigned to all activities.

## REORGANIZATION

A new organizational structure, consistent with the size of staff and scope of functions existing in fiscal year 1954 and projected for the ensuing year, was recommended to the Department and authorized by the Secretary in February 1954. Realignment of functions and transfers of personnel to carry out the approved reorganization were completed in March. While this reorganization reduced the organizational structure from 16 to 5 elements, a logical separation of functions is permitted and simplicity and flexibility in the use of personnel is so provided that maximum accomplishment of the agency's increasing workloads may be obtained with the reduced working force.

Physical disposition was made of surplus equipment to other bureaus within the Department, and approximately 25 percent of the office space previously occupied was vacated during the year.

## POWER SALES ARRANGEMENTS

Power was disposed of under long-term or temporary marketing arrangements for each project in operation during the year as follows:

*Cumberland Basin projects.*—(Dale Hollow, Center Hill, Wolf Creek)—the entire output of these projects was sold to the Tennessee Valley Authority under a long-term contract negotiated by the Department in 1948. Agreement was reached with the Authority during the year on a temporary increase in the annual payment to reflect increased capacity installed at the Dale Hollow project. The Authority was notified of Southeastern's desire to review the contract rate provisions in order to determine whether a change in the applicable charges is necessary to attain the contract objectives of covering all fair and reasonable costs of producing power and energy at the projects.

*Allatoona project.*—The entire output of this project was sold to the Georgia Power Co. under a long-term contract negotiated by the Department in 1950.

*John H. Kerr project.*—Two-thirds of the output was disposed of under the wheeling and firming contract executed in 1952 with the Virginia Electric & Power Co. Power sales contracts were executed with 1 rural electric cooperative in Virginia and 5 cooperatives in North Carolina bringing to 17 the number of preferred purchasers served under the wheeling-firming contract. Contract demands for 11 cooperatives were increased during the year. Such new and revised contracts provide for the utilization of 60,000 kilowatts, the maximum amount of power available for sale to preferred purchasers under the wheeling-firming arrangement.

As the year ended, temporary disposal arrangements were being considered for the recently made available remaining one-third of the project's output.

*Philpott project.*—Operation began in September and temporary disposal was made of the entire output throughout the year to the Appalachian Electric Power Co. under a short-term, interim agreement pending the negotiation of long-term arrangements for this project.

*Clark Hill project.*—Power was sold to the South Carolina Public Service Authority under a long-term contract executed in 1953 and to the Greenwood County Electric Power Commission under a long-term contract renegotiated during the year. These long-term arrangements provide for the sale of 40,000 and 10,000 kilowatts, respectively. Terms and conditions to govern an additional long-term sale to the Authority were considered but final resolution deferred until long-term arrangements had been secured for power to be marketed in Georgia from the project.

The long-term disposition arrangements for power to be marketed in Georgia received secretarial consideration, but no final resolution had been reached as the year ended. Temporary disposal was made to the Georgia Power Co. under an existing short-term interim agreement which was extended monthly as required until terminated by the company during the last month in the year.

Further temporary disposition was made to the South Carolina Electric & Gas Co., which volunteered a desire to interconnect its system with the project for the purchase of secondary and dump energy. A short-term arrangement was negotiated to accomplish this purpose.

## COST ALLOCATIONS AND RATES

Pursuant to departmental directives issued after agreement on the formulation of cost allocations had been reached among the Department, the Corps of Engineers, and the Federal Power Commission, the agency met with district and regional representatives of the corps and FPC to reconcile differences in results obtained from studies by the respective agencies relating to cost allocations for the John H. Kerr, Philpott, Allatoona, and Clark Hill projects. As the year ended, substantial agreement had been reached among the agencies as to the allocation of costs.

Development of preliminary repayment schedules, tax studies to determine loss in local tax revenue caused by construction of projects, and various economic analyses were made for the several projects preparatory to the filing of rate approval requests with the Federal Power Commission for long-term disposal arrangements.

Requests for approvals of interim rates contained in short-term contracts made during the year for temporary disposal of power from the Philpott and Clark Hill projects were submitted to the Federal Power Commission with subsequent approval and confirmation of the rates granted by FPC.

## OPERATIONS AND PLANNING

Continuing study was performed on the hydrologic, economic, and engineering factors which affect power disposal arrangements. Systematic attention was given during the year to long-term tasks such as collection of data specifying the nature and extent of power loads, determination of firming energy requirements for specific contracts, assessment of operating characteristics of projects, and engineering and costs studies of alternative means for the transmission of power between projects and to purchasers.

Of particular importance was the study begun during the year of methods for coordinating the electrical operation of present and fu-



ture projects. The benefits available from an integrated operation of the existing Clark Hill project and the Jim Woodruff project now under construction were determined after extensive study, and the electrical means required to secure such integrated operation were defined.

There was considerable rescheduling by the Corps of Engineers of initial operation dates of generating capacity. Two of the four new projects under construction in the area were rescheduled to reflect delays of 12 to 18 months. At the beginning of the year, 11 authorized projects were scheduled for initial operation before 1960, by the end of the year only 2 authorized projects were still scheduled for operation before 1960, the remainder having been rescheduled for indefinite dates after 1960 or deferred for further study.

## CONSTRUCTION

As the year began there was in effect a preliminary injunction and there was pending in the Federal Courts a suit brought by two private utilities to enjoin permanently further construction by the agency of a 41-mile transmission line from the Clark Hill project to the Greenwood County Electric Power Commission. The Congress, in the Interior appropriation bill, 1954, authorized the disposition of the partially completed line to the Commission on terms that would reimburse the United States. Agreement was reached among the agency, the Commission, and the construction contractor on disposal arrangements. Subsequently, the companies agreed to a procedure for terminating the suit, the preliminary injunction was dissolved by the courts, the companies' petition was dismissed, and agreement was entered into with the Commission transferring all of the rights and interests which the Government had in the line.

## POWER RESOURCES

### *Installed generating capacity*

Project	Basin	Kilowatts installed capacity	
		Beginning of year	End of year
Dale Hollow.....	Cumberland.....	36,600	54,600
Center Hill.....	do.....	135,000	135,000
Wolf Creek.....	do.....	270,000	270,000
Allatoona.....	Coosa.....	74,000	74,000
Clark Hill.....	Savannah.....	120,000	240,000
John H. Kerr.....	Roanoke.....	108,000	204,000
Philpott.....	do.....		14,000
Total.....		743,600	991,600

*Capacity under construction*

Project	Basin	Kilowatts ultimate capacity
Clark Hill.....	Savannah.....	40,000
Jim Woodruff.....	Apalachicola.....	30,000
Buford.....	do.....	85,000
Old Hickory.....	Cumberland.....	100,000
Cheatham.....	do.....	36,000
Total.....		292,000

*Capacity authorized for construction*

Project	Basin	Kilowatts ultimate capacity
Hartwell.....	Savannah.....	300,000
Fort Gaines.....	Apalachicola.....	130,000
Carthage.....	Cumberland.....	92,000
Celina.....	do.....	64,800
Three Islands.....	do.....	9,000
Stewarts Ferry.....	do.....	13,500
Millers Ferry.....	Alabama.....	57,000
Jones Bluff.....	do.....	51,000
Booneville.....	Kentucky.....	7,300
Jessamine Creek.....	do.....	13,900
Salem Church.....	Rappahannock.....	64,000
Gathright.....	James.....	34,000
Bluestone.....	Kanawha.....	180,000
Total.....		1,016,500

POWER SALES AND REVENUES

*Power sold*

Project	Capacity (kilowatt)	Energy (kilowatt-hours)			
		Firm and Secondary	Dump	Condenser operation	Total
Clark Hill.....	115,000	422,742,000	105,500,750	0	528,242,750
John H. Kerr.....	162,700	310,379,672	40,505,500	876,600	351,761,772
Philpott.....	12,000	12,426,100	1,815,700	0	14,241,800
Allatoona.....	87,300	109,396,000	5,851,000	7,147,000	122,394,000
Dale Hollow.....	54,000	65,227,000		5,246,000	70,473,000
Center Hill.....	135,000	292,094,000		14,137,000	306,231,000
Wolf Creek.....	270,000	413,500,000		32,158,000	445,658,000
Total.....	836,000	1,779,437,722		59,564,600	1,839,002,322

*Purchasers*

	Capacity (kilowatt)	Energy (kilowatt- hours)
<b>Clark Hill:</b>		
South Carolina Public Service Authority.....	59,000	236,365,000
Greenwood County Electric Power Commission.....	10,000	109,099,000
Georgia Power Co.....	46,000	160,090,000
South Carolina Electric & Gas Co.....		22,688,750
<b>John H. Kerr:</b>		
Mecklenburg Electric Cooperative.....	6,958	27,014,150
Southside Electric Cooperative.....	8,121	33,044,942
Northern Piedmont Electric Cooperative.....	2,412	10,244,765
Shenandoah Valley Electric Cooperative.....	6,624	30,129,595
Virginia Electric Cooperative.....	6,810	30,835,200
Prince George Electric Cooperative.....	1,143	4,594,950
B-A-R-C Electric Cooperative.....	2,400	9,118,800
Craig-Botetourt Electric Cooperative.....	1,143	4,028,470
Community Electric Cooperative.....	2,719	10,873,260
Northern Neck Electric Cooperative.....	2,071	9,388,240
Central Virginia Electric Cooperative.....	3,966	16,243,857
Prince William Electric Cooperative.....	1,603	6,223,020
Albermarle Electric Membership Corp.....	1,409	4,830,960
Edgecombe-Martin County E. M. C.....	1,725	7,340,813
Halifax Electric Membership Corp.....	1,024	3,608,000
Roanoke Electric Membership Corp.....	3,425	11,675,548
Woodstock Electric Membership Corp.....	983	3,236,918
Virginia Electric and Power Company.....	108,164	129,330,284
Philpott: Appalachian Electric Power Co.....	12,000	14,241,800
Allatoona: Georgia Power Co.....	87,300	122,394,000
Dale Hollow, Center Hill, Wolf Creek: Tennessee Valley Authority.....	459,000	822,362,000
<b>Total.....</b>	<b>836,000</b>	<b>1,938,022,322</b>

*Revenues earned*

Project	Revenue this fiscal year	Revenue last fiscal year	Total revenue to date
Clark Hill.....	\$2,619,918.89	\$631,177.30	\$3,251,096.19
John H. Kerr.....	2,697,171.58	1,381,234.73	4,078,406.31
Philpott.....	166,504.25		166,504.25
Allatoona.....	924,128.50	954,076.50	4,170,231.07
Dale Hollow.....	1,523,300.00	1,982,100.00	10,286,900.00
Center Hill.....			
Wolf Creek.....			
<b>Total.....</b>	<b>7,931,023.22</b>	<b>4,948,588.53</b>	<b>21,953,137.82</b>



## Defense Electric Power Functions

Fred G. Aandahl, *Assistant Secretary*



THE administration of certain functions with respect to electric power are vested in the Secretary of the Interior under the Defense Production Act of 1950, as amended (50 U. S. C. App. 2061), Executive Order 10480 of August 14, 1953 (18 F. R. 4939), Office of Defense Mobilization Order I-7, and Office of Defense Mobilization letter dated June 30, 1953, to the Assistant Secretary—Water and Power.

The Defense Electric Power Administration was abolished effective June 30, 1953, by Department of Interior Order No. 2721 dated May 7, 1953. The defense functions in this field were delegated to the Assistant Secretary—Water and Power Development, by section 2 of Secretarial Order 2764, dated June 29, 1954. Programs are conducted in connection with general supervision of electric power expansion to assure an adequate power supply for the Nation, and allocation functions to assure delivery of materials needed by the electric power industry for the 89 E-5 rated units committed for interim, firm, and backup power supply to the AEC program.

Authority to use the E-5 program identification, replacing the H-3 rating, has been extended to 52 power projects associated with AEC power supply. Under the Defense Materials system allotment of materials as required have been made for this program. Due principally to severe slippages in some turbine deliveries in the past and in some isolated instances during the current year, the program has lagged. However, 50 units are now scheduled to be in operation by the end of 1954, 83 by the end of 1955, and the entire 89 by the end of June 1956.

Through June 30, 1954, applications for certificates of necessity for rapid tax amortization for 928 electric utility projects and 43 industrial powerplants were received. Of these 700 and 41 respectively were recommended for approval. Certificates of necessity recommended were related to an increase in the Nation's electric power capacity of 27,718,155 kilowatts from electric utility systems and 862,150

kilowatts from industrial power plants. On December 3, 1953, ODM by order VII-6 placed the electric power goal No. 55 on the suspended list. The Department of the Interior has recommended to the Office of Defense Mobilization that power goal No. 55 be closed provided, however, that all applications for necessity certificates received after the goal was placed on the suspended list December 3, 1953, and prior to the closing date, be processed if they are eligible under the terms of the present goal and transmission lines and/or substations for service to any defense project for which a tax amortization certificate has been issued under any open goal shall remain eligible for consideration or appropriate action for tax amortization assistance.

The electric power goal No. 55 called for the installation of 41 million kilowatts of new generating capability by the end of 1955, and 1 million kilowatts for certain defense related projects in 1956. Attainment of this goal would increase the national generating capability from 75 million kilowatts at the end of 1951 to 116 million kilowatts at the end of 1955. The capabilities added in 1952 and 1953 and the indicated additions for 1954 through 1955 are:

	<i>Millions of kilowatts</i>
1951 total at year end.....	75.0
Added during 1952.....	6.5
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1952 total at year end.....	81.5
Added during 1953.....	9.5
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1953 total at year end.....	91.0
Additions during 1954 (estimated).....	12.5
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1954 total at year end.....	103.5
Additions during 1955 (estimated).....	12.5
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1955 total at year end (estimated).....	116.0

The capabilities presented above for the years 1954 and 1955 are based upon existing construction schedules and plans of the individual power systems for bringing new power projects into commercial operation. In previous reports, difficulty in maintaining construction schedules because of shortages of materials for equipment manufacture and plant erection have been emphasized. Such difficulties have now been largely removed making it possible to carry out further expansion without serious delays.

The Department of the Interior and the Federal Power Commission have examined the electric power situation for the 3 years 1955 through 1957, and in estimating the load requirements and capabilities it has been assumed that there will be a continuation of partial mobilization and a sustained high level of economic activity. The present peak load

estimate for 1957 approaches 112 million kilowatts, however, utility planning indicates 130 million kilowatts of generating capacity will be in service by the end of 1957, which will provide prudent gross margins of capacity in most regions.



# Saline Water Conversion Program

David S. Jenkins, *Director*



IN JULY 1952, because of the constantly expanding need for new sources of fresh water, and the increasing salinity of many waters already being used, Congress authorized the Saline Water Conversion Program for an initial period of 5 years. The act (66 Stat. 328, 42 U. S. C., sec. 1951) provides for research into and development of practical means for the economical production, from sea or other saline water, or water suitable for agricultural, industrial, municipal, and other beneficial consumptive uses, and for other purposes, as necessary to conserve and increase the water resources of the Nation.

Although the original legislation would have provided for immediate construction and operation of a demonstration plant at \$25 million, testimony by eminent engineers and scientists established clearly that processes for the economical production of large quantities of fresh water at low cost did not exist. Accordingly, the statute provides appropriately instead for the development of such processes. Furthermore, although good progress is being made, to date such processes have not been developed to the stage that would justify the expenditure of public funds for the construction and operation of such demonstration plants either in the United States or abroad.

The program is devoted equally to the improvement of the many inland saline surface and underground waters and to the conversion of sea water for useful purposes. The Department's responsibility is twofold: first to stimulate research and development in saline water utilization by exchange of information and coordination of private and public research in the field; and by encouraging such development through research grants and contracts.

The first year was devoted to organization of the research program. During the second year considerable research and development has been initiated by the Department through contracts with private scientific and industrial institutions. Most of the scientific and engineering leaders in the field are assisting either as research

contractors or in the capacity of consultants. Nine eminent leaders of educational, scientific and industrial institutions serve as advisers to the Secretary of the Interior concerning the broad policy aspects of the program and its economic and social potentialities. In addition a Departmental Saline Water Conversion Program Committee consisting of one representative each from the Office of the Assistant Secretary for Water and Power Development, the Bureau of Reclamation, the Bureau of Mines, and the Geological Survey provides advice and assistance in such matters as technical evaluation of research, development and review of the program, exchange of information and coordination of activities in connection with the program, and preparation of the annual reports.

The research is continuously coordinated with the Department of Defense in accordance with the Saline Water Act of 1952 and with the National Science Foundation with which a cooperative agreement exists. Other governmental organizations with which cooperation has been established include the Atomic Energy Commission, the Smithsonian Institution, Federal Civil Defense Administration, the Department of Agriculture, Department of State, the Foreign Operations Administration, and Department of Commerce.

It is clear that no one process will meet all purposes. Instead several different processes are needed each providing optimum performance under different combinations of location and quality of the existing saline waters and the character and magnitude of the water requirements. Some of the considerations are: Salinity of the original water, i. e. sea water or brackish waters of many varieties; magnitude and types of industrial needs, extent and size of each separate municipal need; irrigation requirements in various soils, climates and quantities; individual farm supply requirements, including livestock water; the availability of other water supplies for total or partial blending with totally or partially treated water; the possibility of changing entire local uses; and use of dual systems.

For these reasons, and because the cost of existing treatment processes so far exceeded the maximum costs then considered practicable for the several uses, all processes and phenomena and energy sources which might conceivably be developed for the purpose were considered. Clearly impractical processes are being eliminated. Others are investigated and developed. Research and development contracts have been awarded to responsible organizations covering more than a third of the apparently potential processes or phenomena. These include vapor compression distillation, critical pressure devices, low temperature differences, solar evaporation, freezing, molecular oil films, immiscible liquids and various membranes.

Already one process for one major purpose—that of improving brackish water to render it useful for irrigation—shows encouraging results. Under contract with Ionics, Inc., of Cambridge, Mass., the Department has been investigating the process variables of an ion transfer membrane demineralizer. The process makes use of plastic membranes and electric current to remove the salt from salt water. The membranes are set up in a stack similar to a filter press with passages for the water between the membranes. The membranes are either positive or negative in character. A positive membrane is adjacent to a negative membrane in the stack. This makes possible the passage through the membranes of the positive salt ions in one direction and the negative salt ions in the other direction when electrical current is applied at the ends of the stack. By this action the water passing between alternate membrane pairs is depleted in salt, while that between the intervening pairs is enriched.

A 100-gallon-per-hour membrane demineralizer was assembled and subjected to rigid laboratory testing on brackish water. A new contract covers extensive field testing using larger apparatus on western brackish waters, thus exposing the unit to field conditions to determine its durability and other operating characteristics, and to obtain firmer estimates of the overall cost of treating water by the process on a large scale.

Under an exploratory contract with the Department, Polytechnic Institute of Brooklyn is to develop a different type of membrane demineralization which it is hoped will be capable of separating different minerals on a selective basis.

Good progress is being made on two other processes for desalting sea water. One is a version of vapor compression distillation where most of the heat used to evaporate the water is recovered through compression of the vapor and reused to evaporate additional water. The new process involves conditioning of the water mechanically to encourage rapid boiling by overcoming a possible obstructive skin on the surface of the water. The proposed means of accomplishing this would increase heat transfer coefficients severalfold over what has been considered practicable heretofore, thus reducing the cost of distilling water to a fraction of present costs. The Department's research and development work on this process is being conducted in conjunction with the Badger Manufacturing Co.

The other method is that being explored by the Department under a contract with Nuclear Development Associates of White Plains, N. Y. This process involves the possibility of using extremely high temperatures and pressures to obtain a phase separation of dissolved salts from sea water at the supercritical region of water.

Laboratory research on three other processes is successful so far and appears promising. The osmotic membrane process in which salt



is literally forced from the water by high pressure is undergoing extensive research and experimentation under the Department's program at the University of Florida. Although the flow rate is very small one material has been found to remove 90 percent or more of the salt from sea water. The Department also has under study at the University of California a different type of membrane, namely, an extremely thin oil layer supported by capillary action. Application of such a principle involves the selective action of the osmotic oil membrane which allows water molecules to diffuse through it while other molecules are blocked. Still another method being considered by the Department is that incorporating the solvent extraction process being developed under contract with Texas A. & M. Research Foundation. This process makes use of organic solvents in which inorganic salts are quite insoluble but which will dissolve water readily. Since the solubility of water in many organic solvents decreases rapidly with temperature a portion of the salt-free water may be removed from the solvent phase by cooling it.

Research on solar distillation and separation by freezing is getting under way and offers good promise for specific uses. Studies on the use of solar energy for demineralization show a good possibility of competing favorably with present conventional vapor compression distillation and multiple-effect evaporation in some locations. Demineralization by freezing is being studied from the basic research standpoint in order better to understand the various phenomena occurring during crystallization.

Experience of the past year has shown that a few industrial firms are willing to undertake research on process development independently. Most of those firms are cooperating with the Department by exchanging information on their developments even though no contract exists. Their number is relatively small and for this reason it may become necessary to increase somewhat the participation by existing Government laboratories so as to assure development of needed processes.

After 2 years it seems apparent that during the initial 5-year period some of the several needs will be met or partially met and that the results obtained during that period will contribute to subsequent development of processes to serve additional needs; that economically feasible processes for improving some but not all brackish waters for some purposes will have been developed; that the cost of converting sea water will have been reduced materially making it usable for some industrial and municipal purposes; and that a substantial part of the uses may be met within 10 to 15 years. Thus it appears that it will be desirable to give early consideration to the extension of the authorization beyond the present initial 5-year period.



# Office of the Assistant Secretary Mineral Resources

Felix Edgar Wormser, *Assistant Secretary*



THE Assistant Secretary for Mineral Resources discharges the duties and performs the functions of the Secretary of the Interior in the field of the development and utilization of minerals and metals, including mineral fuels. These include as a primary responsibility the exercise of Secretarial direction and supervision over the Bureau of Mines, the Geological Survey, the Defense Minerals Exploration Administration, the Division of Oil and Gas. He also exercises similar supervision over the Division of Geography.

During the fiscal year 1954, the Secretary appointed two groups of highly qualified consultants from private life to survey the operations and practices of the Geological Survey and the Bureau of Mines. The recommendations of these two Survey Teams were carefully reviewed by the Assistant Secretary with appropriate bureau officials. Minor modifications were incorporated in certain instances, but most of the recommendations were scheduled for immediate or early implementation. Greatly improved management of the Department's activities within the minerals field should be the result.

The Office of the Assistant Secretary for Mineral Resources participated in the planning which preceded an orderly transfer of petroleum and gas mobilization functions from the Petroleum Administration for Defense to the Division of Oil and Gas. Defense functions with respect to solid fuels were placed on a standby basis within the Bureau of Mines.

In addition to his responsibilities within the Department the Assistant Secretary acts as Interior's principal spokesman and adviser on minerals affairs at policymaking levels within the Federal Government. He represents the Department on the Interdepartmental Materials Advisory Committee, the ODM Titanium Committee, and interagency committees on foreign economic policy. During the year the Assistant Secretary participated in the work of the Sub-Cabinet Committee for the Rio Economic Conference.

In addition, the Office of the Assistant Secretary for Mineral Resources coordinates the representation of the Department on the Advisory Committee (to the Secretary of Commerce) on Export Policy,



in implementation of the Export Control Act of 1949. Petroleum and petroleum products, and several of the minerals and metals have been problem commodities requiring special export control attention.

The Office of the Assistant Secretary also provides the primary point of Government contact with mineral and metal producing industries. During the past year much personal effort has been devoted to establishment of closer working relationships with individuals and groups having an interest in mineral resources development.

An extremely significant development during the fiscal year 1954, was the establishment of a Cabinet Committee on Minerals Policy. By letter of October 26, 1953, the President asked the Secretary of the Interior to organize and to serve as chairman of a special committee to inquire into national policies affecting the production and utilization of metals and minerals. The Director of the Office of Defense Mobilization, the Secretary of State, and the Secretary of Commerce were designated as members, and the Secretary of the Treasury and the Director of the Bureau of the Budget were asked to serve as consultants. In each instance Cabinet members named alternates at the Assistant Secretary level. As the alternate member from the Department of the Interior, the Assistant Secretary for Mineral Resources organized and supervised staff work and met frequently with other alternates to prepare final position papers for consideration by the Cabinet group. Most of the groundwork had been completed prior to March 1954.

Certain basic proposals of the Committee on Minerals Policy were discussed with the President and the full Cabinet during the month of March. One recommendation made by the Committee called for expansion of the strategic stockpiling program as a means of strengthening the Nation's minerals mobilization base. This recommendation was endorsed by the President in an announcement made on March 26, 1954. The Cabinet Committee's work continued throughout the balance of fiscal year 1954, with the final report scheduled for delivery to the President early in fiscal year 1955.

In anticipation of a delegation of authority from the Office of Defense Mobilization, the Assistant Secretary initiated a series of mobilization studies within the minerals and metals field. An exhaustive analysis of the lead-zinc situation was completed within the fiscal year 1954 and a study on fluorspar was begun. The Assistant Secretary also developed tentative plans for organization of mobilization planning activities within the minerals area.

# Geological Survey

W. E. Wrather, *Director*



ON MARCH 3, 1954, the Geological Survey began its 75th year of work under the charter providing for " \* \* \* classification of the public lands, and examination of the geologic structure, mineral resources, and products of the national domain." Through the work of 7,000 employees in the field and in laboratory and office, it investigates the mineral and water resources of the Nation, maps the topography and geology, and publishes the results of this work to aid in satisfying the complex demands of a constantly growing country. The scientific work of the Survey is accomplished through four divisions whose activities during the year are described in the statements that follow.

## GEOLOGIC DIVISION

During fiscal year 1954, the Geologic Division continued its study of the geology of the United States and of the mineral resources of the Nation. Responsive to increasing concern over the future adequacy of these resources, the Division continued to emphasize the development of new and improved methods of exploration for mineral resources, supported by a broad program of basic research.

Photogeologic techniques were further refined and their application expanded; the acquisition of a trailer laboratory widened the usefulness of geochemical and geobotanical prospecting; the development of a shallow-reflection seismograph brings a new technique to the search for mineral deposits; a full year of operation of a second airplane for geophysical exploration has greatly expanded the scope of airborne magnetometer and radiometric investigations; and the application of modern statistical methods to problems of field geology (begun during the year) is expected to be of great help in mineral exploration.

Survey geologists continued their roles in the programs of the Defense Minerals Exploration Administration and the Emergency Procurement Service; in geologic investigations of mineral resources in

Latin American, Middle and Far Eastern countries for the Foreign Operations Administration; in a broad program of investigations of fissionable materials resources for the Atomic Energy Commission; in investigations of terrain conditions for the Armed Forces; and in serving as advisers and consultants to the National Science Foundation, the Office of Defense Mobilization, and the Department of Defense.

### *Mineral Deposits*

Field work was conducted on 90 projects in 25 States; 9 of these projects were carried out in cooperation with State agencies. Exploratory drilling was continued on the Tintic, Utah, and Mojave Desert, California, projects, and on the Colorado Plateau. Regional mineral-resource studies were continued for the New England-New York Inter-Agency Committee and the Arkansas-White-Red Rivers Inter-Agency Committee. Survey geologists, in cooperation with engineers of the Bureau of Mines, continued to evaluate applications for loans to corporations and to supply technical advice needed for effective execution of contracts under the Defense Minerals Exploration Administration and the Emergency Procurement Service. Geological exploration and research on behalf of the Atomic Energy Commission were continued on the Colorado Plateau.

Notable accomplishments made during the year have produced valuable information on the Nation's mineral resources and have encouraged prospecting in several areas. A talc deposit was discovered in Vermont in an area not previously known to contain talc. In California suggestions made by Survey geologists while doing exploration work for the Defense Minerals Exploration Administration at the New Idria mine led to the discovery of mercury reserves totaling 4,000 flasks, equivalent to nearly 32 percent of the mercury produced in the United States in 1952. Field work near Sugar Pine Creek, Idaho, led to the discovery of a 15-foot-thick section of high-grade phosphate rock. In the Cuyuna Range, Minn., subdivision into mappable units of the stratigraphic section that includes two iron formations has greatly aided exploration in the area. A quick field test for approximate iron content was developed as a modification of the field test for titanium during field studies in the Cuyuna Range. A quick and accurate method of field analysis for niobium was developed in the laboratory of the Geochemical Prospecting Unit and the methods devised have been of great aid in the geological exploration of mineral deposits. Again this year, intensive geologic studies on the Colorado Plateau have resulted in finding new deposits of significant size and have extended known reserves of other deposits.



### *Petroleum and Natural Gas*

In its effort to provide timely information of maximum usefulness for oil and gas exploration, the Survey did geologic mapping in areas on the frontier of oil exploration, such as the Pacific Northwest, studied the stratigraphy and lithology of deeper Paleozoic rocks in the midcontinent region, investigated the distribution and origin of oil-producing limestone reefs in Texas, and did research on the accumulation of oil and gas under hydrodynamic conditions. Efforts are made to insure that oil and gas investigations are undertaken where the need for exploration is greatest and in fields not thoroughly explored by commercial geologists, State surveys, and universities. During the year the Survey had 45 projects in 23 States that were primarily oil and gas studies.

An oil and gas laboratory was established in the spring of 1954 at Denver to conduct research on the origin, migration, and accumulation of oil and gas; to solve problems in petroleum geology and related fields of sedimentation, paleoecology, paleogeography, and paleotectonics; and to supplement the work of field projects.

### *Coal*

The Geological Survey continued mapping of coal beds and intervening rocks in selected coal-bearing areas. Such detailed study of the extent, thickness, and correlation of coal beds and estimation of the reserves present in each bed provides the only route to full knowledge of the amount of coal available for present and future use. Eighteen such projects were carried on in 12 States, and reports were published giving the results of previous work in 3 areas in Indiana, 3 in Montana and North Dakota, 2 in Kentucky, and 2 in the Pennsylvania anthracite fields. One report on coal was placed on open file.

A progress report summarizing results of the Survey's program to reestimate the coal resources of the United States was published. Reappraisals of coal resources have now been made for about half of the States, and during the year new detailed estimates of the coal resources of Colorado and Indiana were published. Work leading to similar reports was carried on in Kentucky, Alabama, Arkansas, and Oklahoma.

During the spring of 1954 the Geological Survey and the Bureau of Mines agreed to readjust work on coal resources so that this responsibility, formerly shared by the two bureaus, will be entirely assigned to the Geological Survey by fiscal year 1956.

### *Oil Shale*

The Survey continued to acquire knowledge of our reserves of oil shale. When the time comes to augment our petroleum supplies, it will be of great importance to know where the richest deposits are. With accelerated demands for petroleum, it is necessary for the country to appraise its secondary and emergency sources of oil.

A study and estimate of oil shale reserves in Naval Oil Shale Reserve No. 2, in eastern Utah, were made for the Navy. Similar studies were also extended to the east into Colorado and south to include the principal adjoining areas of oil shale outside the Naval Oil Shale Reserve. Oil shale studies were continued in New York throughout the year.

### *Engineering Geology*

General service geologic mapping continued to provide valuable basic data for the industrial, agricultural, and social development of the country. Major emphasis is placed on the mapping of large urban or rural areas to provide maximum geologic information for use in the early planning and construction stages of various engineering projects. The work is all a part of the long-range program of mapping the geology of the United States.

Twenty-five field investigations in 10 States were in progress during the year. Detailed mapping was completed for three projects in the Missouri River basin and geologic mapping continued in Massachusetts and Rhode Island under cooperative agreements. Detailed engineering geologic investigations were continued in expanding urban areas, including the San Francisco Bay region, Los Angeles, Seattle, Denver, Knoxville, and Portland, Oreg. Research on general and specific landslide problems was continued in the Lake Roosevelt area, Wash., and at the Fort Randall reservoir in South Dakota. The Survey contributed to the efforts of the Committee on Landslide Investigations, Highway Research Board, which is preparing a report on landslides and engineering practice.

In addition to the basic mapping program, several special geologic studies were undertaken for other Federal and State agencies. These included a landslide investigation at the naval radio station at Arlington, Wash.; study of foundation conditions near a naval ordnance station; study of foundation conditions near Colorado Springs, Colo., for the Federal Housing Administration; and a cooperative study with the Colorado Highway Department of geologic conditions along a road being relocated near Marshall, Colo.

## *General Geology*

General geologic activities embrace studies in volcanology, metamorphism, tectonics, sedimentation, glaciology, surficial geology, and the geology of soils. Many of these studies are related to general mapping projects in areas where potential mineral resources are as yet unknown.

During the year, general geologic field activities included 24 studies in 16 States, the Aleutian Islands, and the Territory of Hawaii. The knowledge gained from mapping and studying the geology of uranium- and phosphate-bearing formations in South Carolina and Florida will be most important in the search for new deposits of these minerals.

The Hawaiian and Aleutian projects are concerned chiefly with the mapping and studying of volcanoes and volcanic rocks, but in the Aleutians strategic terrain studies were made for the armed services. During the year two volcanic eruptions were studied. In July 1953 Mount Spurr, on the Alaska Peninsula, had a brief but violent eruption and showered ash on the city of Anchorage. The results of these ash falls and the potential danger of future falls were studied and reported on. In late May and June 1954 a 5-day eruption of Kilauea volcano on Hawaii was studied in great detail by the staff of the Survey's permanent observatory on that island. One of the chief objectives of the observatory staff is to learn enough about volcanic processes to predict eruptions more accurately and thus save human lives.

## *Geophysics*

The objectives of the geophysics program are to assist in the solution of geologic problems by the use of the methods and techniques of physics and mathematics. The program consists of field and laboratory studies of the physical properties and behavior of earth materials and associated theoretical and experimental investigations, the development and modification of geophysical instruments and methods used in the search for mineral resources and in geologic studies, and the compilation of reference material. Field investigations include both airborne and ground surveys.

In the past year, two aircraft were operated. Airborne radioactivity surveys totaling about 30,000 traverse miles in 8 States were made for uranium- and thorium-bearing materials. Large radioactivity anomalies led to the discovery of ore-grade material in north-central Arizona and in the Black Hills of South Dakota. Aeromagnetic surveys were made in 6 States and Alaska.



Ground surveys by one or more of the standard gravity, magnetic, seismic, or electrical methods, were made in 10 States, in Alaska, and in Greenland to obtain information on subsurface structure or stratigraphy in investigations of mineral deposits and water supplies, and in military and engineering studies. Regional geophysical studies were underway in the Mojave Desert area of California and in the Colorado Plateau. In the Mojave Desert, gravity and aeromagnetic surveys have yielded valuable information on the geologic structure underlying alluvium. The studies of the Colorado Plateau are aimed at gaining a fuller understanding of the regional geology than can be obtained from surface studies alone, and of learning whether there is a relation between regional geologic features and the occurrence of uranium.

Development of new instruments and modification of existing equipment have been undertaken to meet the requirements of special geologic studies. Included among these are instruments for measuring thermoluminescence and the magnetic properties of rocks, and scintillation counters for use in cars, light aircraft, and in drill holes. A major contribution has been the development and successful testing of a shallow-reflection seismograph. The seismic-reflection method has heretofore been used only in detailed structural mapping at depths greater than 500 feet, where it has accounted for a high proportion of new oil discoveries in recent years. The shallow-reflection method developed by the Survey makes possible detailed mapping in the depth range of 50 to 1,000 feet. This method is expected to be of great value in exploration for minerals and in ground-water and engineering studies.

Theoretical and experimental studies during the year included those of the scattering and absorption of gamma radiation, of the relationship of negative magnetic anomalies to the chemical and mineralogic composition of rocks, of the thermal properties of permafrost and the effect of buildings and other construction on permafrost, and of the methods of interpretation of total-intensity aeromagnetic maps.

### *Geochemistry and Petrology*

Chemical and spectrographic analysis, mineralogic and petrographic examination, radioactivity determinations, and X-ray and other examinations were made of nearly 100,000 specimens, including the preparation of about 15,000 thin and polished sections of rocks and minerals.

Notable advances were made in the application of X-ray fluorescence to determination of elements such as niobium, thorium, and selenium, in the development of spectrographic and chemical methods for

thorium and the rare-earth elements, and in the perfection of a simple and rapid field test for germanium. A trailer laboratory equipped for field geochemical prospecting was put in operation. Ceramic equipment was developed for grinding samples without contamination by traces of foreign metals.

In the search for guiding principles in exploration of mineral resources, much basic research on processes of mineral formation has to be done. One achievement toward this goal was the first practical trial of a direct method of determining the atomic structure of crystals, in which the structure of the boron mineral colemanite was calculated by the new Hauptman-Karle method with punched-card machines. Others are the completion of a systematic guide to identification and occurrence of uranium and vanadium minerals of the Colorado Plateau; experimental synthesis of complex uranium and vanadium minerals; development of apparatus for studying acidity and oxidation changes in ores leached by natural waters; development of new methods of determining the age of rocks from their zircon and monazite compositions; and development of methods for estimating temperature of formation from liquid inclusions in crystals. In the first year of its operation, the laboratory for age determination by radio-carbon analysis has obtained results that contribute substantially to clarifying the confusion in assigned sequences of glacial events of the late Pleistocene era. Two mass spectrometers were put into operation for studying processes of mineral deposition by measuring isotopic atoms as clues to migration and diffusion, and for determining ages of formation.

A beginning was made toward applying modern statistical methods to problems of field geology.

### *Paleontology and Stratigraphy*

Survey specialists in the past year completed 117 reports of investigation presenting basic information on the distribution of fossil faunas and floras, on paleoecology, and on biogeochemistry—information essential for the solution of many problems in applied geology. Fifty-three of these reports have already been published.

More than 40,000 fossil specimens from 31 States, Alaska, and 14 areas outside the continental United States were examined by these specialists and the resulting information incorporated in 504 factual and interpretive reports. These reports are mostly for immediate use by Geological Survey and other Federal geologists and for eventual inclusion in publications by them.

Faunal studies of the subsurface rocks of the Williston basin area of the Dakotas and Montana are well advanced and reports on the Car-

boniferous and Ordovician faunas are in semifinal draft. Special research in support of strategic mineral studies such as the fissionable materials program, as well as studies of a more general nature, was continued.

### *Geologic Investigations in Alaska*

Survey activity in Alaska during the year was focused on study and evaluation of the mineral resources of the Territory, with emphasis on strategic and critical minerals and on sources of oil and coal. Investigations of construction materials for military and civilian use, and studies of engineering problems of Federal and Territorial agencies constituted an increasing part of the Alaskan work.

Studies completed in the Yakataga district in fiscal year 1954 included discovery of oil seepages in the Samovar Hills where structural conditions are favorable for entrapment of oil and discovery of evidence of a significant continuation of a long-known major fault associated with oil seepages. Elsewhere, petroleum studies were continued in the Nelchina area and preliminary studies were begun in the western part of interior Alaska and in previously unstudied parts of the Alaska Peninsula. Office compilation of the results of the field investigation in northern Alaska was continued.

Coal investigations were continued in the Little Susitna district of the Matanuska coal field, and geologic guidance was again furnished a Bureau of Mines drilling program at Wishbone Hill in the Matanuska coal field.

Mineral-deposits investigations in progress included continuation of exploratory geologic mapping and reconnaissance for mineral resources in the lower Kuskokwim region; a dip-needle survey of a magnetite area near Klukwan, southeastern Alaska; continued study of copper mineralization, supplemented by photogeologic techniques, in the Prince William Sound area; detailed studies of tin deposits in the western part of the Seward Peninsula; examination of areas of scheelite mineralization near Nome; application of geochemical prospecting techniques to an antimony deposit near Ketchikan; and investigation of a copper prospect on the upper Maclaren River. In addition, cooperative investigations with the National Park Service were carried on at Katmai National Monument.

Engineering geology activities were on a broader and more systematic scale than in previous years. Studies were made of four potential power sites on the Kenai Peninsula; the route of the proposed Denali highway and several critical engineering-geology problems were examined for the Alaska Railroad.

Reconnaissance surveys for fissionable materials continued and a radiometric laboratory was maintained during the prospecting season



at College, Alaska. Compilation, based on existing geologic information, and supplemented by photogeologic study, was begun of preliminary geologic quadrangle maps at a scale of 1:250,000.

### *Military Geology*

Military geologic investigations of the Geological Survey are aimed at providing technical advice on geology, soils, and associated terrain conditions for the Armed Forces. These investigations have become increasingly diversified. The original program, begun in 1942, is still active. It resulted, during the year, in the preparation of 47 comprehensive studies of foreign regions and many more special reports and maps. There were also many direct consultations, such as briefings for military personnel about to begin technical assignments in foreign countries, and advice to military units in the United States on problems involving consideration of geologic conditions.

As a part of the extensive field program in the western Pacific region, in progress since 1946, the detailed mapping of geology and water resources of Guam was completed in November 1953. In addition, the regular but unscheduled part of the program included special consultation for United States Army, Navy, and Air Force units in Guam and Japan on various geologic problems relating chiefly to construction and water supply.

A second field program dating from 1946 is concerned with geologic and associated terrain conditions in Arctic and subarctic regions, particularly Alaska. During the year, field surveys were conducted in Alaska in the Bristol Bay area, southwestern Copper River Basin, central Kenai Peninsula, Susitna-Maclaren district, and along the Iliamna Tote Road from Cook Inlet to Iliamna. Comprehensive military geologic reports were prepared on St. Lawrence Island, the Seward Peninsula, and the Delta River region of Alaska, based on field investigations in previous years. In Greenland, the survey participated in a field project of the Corps of Engineers and Transportation Corps, United States Army.

For the second consecutive year, special assistance was provided to United States Army headquarters in Germany and Austria. Consultations were held on the preparation of terrain studies and a map was prepared of a selected area that will serve Army personnel as a model for making further special-purpose terrain evaluation maps.

Besides giving advice on specific problems, the Survey also furnishes general guidance for military personnel in the use of military geologic reports and maps. For example, a course of instruction was given in the advanced training program for officers at the Engineer School, Fort Belvoir, Va. The removal of a security classification makes it possible to reveal now that the Survey prepared the Army

Technical Manual TM 5-545, Geology and its military applications, published in August 1952. This manual is the only one of its kind in the United States. It is used for technical guidance on military geology by all the military services.

### *Foreign Geologic Investigations*

The Geological Survey's foreign mineral resources studies began in 1941 under the Inter-Departmental Committee on Scientific and Cultural Cooperation with the American Republics and have continued under the sponsorship of the Foreign Operations Administration during fiscal year 1954. Geological investigations were in progress in 16 countries in South America, the Near East, and Asia. In some of these countries geologists worked closely with the geologists from the host country and their findings were published under joint authorship. The long-range purpose of giving scientific and technical assistance in the field of geology to friendly foreign countries is to aid them in discovering, assessing, and developing their mineral resources for the benefit of themselves and the free world.

In Mexico, Peru, and Brazil the long-range mineral resource studies were continued in cooperation with government geologists from those countries. A geologic engineering study was begun at La Paz, Bolivia, in cooperation with city and national officials, for the purpose of city planning to counteract landslide conditions. A general reconnaissance assessment of the mineral potential of Colombia and Ecuador was completed in cooperation with the Servicio Geologico Nacional and the Department of Mines, respectively. Cooperative work continued with the Corporacion de Fomento del Chile in the establishment of a Chilean geological survey as a means of carrying out a countrywide minerals investigation and development program. Cuban and Geological Survey geologists began extensive field investigations of chromite deposits in that country, with emphasis placed on geophysical methods of exploration. Geologic reconnaissance and mapping of western Saudi Arabia in a cooperative search for ground water and minerals were continued. A reconnaissance evaluation of reported occurrences of metallic mineral deposits of Iran and Israel, in cooperation with mineral-resource agencies of those governments, was continued through 1954. A field survey and final analysis of metallic mineral deposits of Egypt were completed to aid the Egyptian Government in its effort to establish a long-range plan of mineral development. One geologist continued as technical adviser to the Geological Survey of India in its field investigations of manganese and other mineral deposits. In the Philippines the Survey and the United States Bureau of Mines con-

tinued their cooperative work with the Philippine Bureau of Mines in a long-range program of minerals and fuels investigation and development. Two Survey geologists began reconnaissance studies of the minerals and fuels resources of Taiwan, in cooperation with the Chinese Nationalist Government. In response to a request from the King of Jordan, a study of the oil possibilities in Jordan was made.

Technical assistance in minerals investigations was continued in Puerto Rico, in cooperation with the Puerto Rican Economic Development Administration.

A total of 34 promising young technicians, leaders, and specialists in the fields of mineral investigations and supporting sciences received on-the-job training in the Survey's domestic field program. These technicians from Afghanistan, Brazil, Burma, Chile, Colombia, Cuba, India, Mexico, Norway, Paraguay, Peru, and the Philippine Islands received not only training in the technical aspects of the work, but also a thorough review of the Survey's administrative practices and organizational procedures in long-range planning for countrywide geological surveys.

### *Geologic Maps*

The Office of Geologic Cartography, in conjunction with the field units, prepared about 2,300 geologic maps, charts, diagrams, and other illustrations, many of them for multicolor reproduction. Final copy for 19 maps in the geologic quadrangle series, 4 mineral investigations maps, 30 fuels maps, 2 geophysics maps, and 4 State geologic maps were transmitted to the Map Reproduction Branch. Fifty-nine other multicolor maps are in various stages of preparation.

The geologic-map editor reviewed and edited 3,074 maps and other illustrations, involving 272 reports. About 77 percent of these illustrations were designated for publication by the Geological Survey; the rest were sent to cooperating State and Federal agencies and scientific journals for publication.

### *Library*

In all activities the Geological Survey Library had its busiest year. About 24,000 items were added to the main library in Washington and much material was acquired for the branch libraries in Denver, Colo., and Menlo Park, Calif. The Denver branch moved into its new quarters in August 1953 and the Menlo Park branch quarters were occupied in January 1954.

Circulation of material in the main library included about 40,000 items loaned to Survey personnel and 4,000 items to other libraries; about 4,000 items were borrowed from other libraries for Survey use.



An estimated total of 72,000 items were used in the library itself. Many of the loans were made outside of Washington to widely dispersed Survey personnel; however, about 19,500 visits were made to the library by Survey employees and about 2,000 visits by others.

The Survey's priceless photographic library, ill housed in Washington, was shipped to Denver in June. It will occupy fireproof, controlled-humidity space as a part of the Denver branch library.

Manuscript preparation of the 1951 volume of the "Bibliography of North American Geology" was completed, and accelerated progress was made on the 1952-53 volume and the cumulative volume for 1940-49. In addition, the 1954 volume was kept current.

## TOPOGRAPHIC DIVISION

The Topographic Division has as its primary objective the completion of an atlas of large-scale (1:62,500 and 1:24,000) topographic maps of the United States, its Territories and possessions. A secondary objective is to maintain the usefulness of the maps by periodic revision. In addition to these specific objectives, related activities such as the preparation of special maps, control surveys, research, and satisfying requests for map information, are all important functions of the Division.

Since it was created in 1879, the Geological Survey has published about 16,000 different topographic atlas sheets which cover about 69 percent of the area of continental United States. Many of the older maps which were made to meet less stringent requirements than those existing today are of limited use. Many of these maps are in need of revision, and some of the areas covered should be completely remapped. However, about 33 percent of the total area of the 48 States is covered by topographic maps of good quality.

During the fiscal year ending June 30, 1954, there were 1,436 quadrangle maps transmitted to the Publications Office for printing and distribution. Of these maps, 1,031 represented new mapping by the Geological Survey, 200 were Geological Survey revisions of existing maps, and 80 were new maps compiled by other agencies and, by interagency agreement, published and distributed by the Geological Survey. The remaining 125 were civil editions of maps which had been compiled previously and published for military use by the Department of Defense. The total area covered by this year's new mapping is about 3 percent of the total area of continental United States.

The Federal mapping program continued to be directed toward national defense requirements, about 50 percent of the productive capacity of the Division having been utilized to meet the immediate map needs outlined by the Department of Defense. The 6-year pro-

gram for mapping of strategic areas, begun by the Division in fiscal year 1951, was further expanded in keeping with additional priority requests received from the Department of Defense and with program adjustments effected in conference with military officials.

A slight decrease in the total funds available for topographic mapping during the past year is reflected in a decrease in personnel. The strength in terms of permanent personnel of the four regional offices at Arlington, Va., Rolla, Mo., Denver, Colo., and Sacramento, Calif., decreased from 2,004 average man-years in 1953 to 1,896 this year, or approximately 5 percent. In spite of this reduced strength, the output of the Division, measured in square miles of completed map compilation and revision in the continental United States, increased from 83,100 to 103,500, or about 25 percent. Of these 103,500 square miles, about 16,000 were in the revision program; this is about the same amount of revision as reported for fiscal year 1953. This increase in production resulted in part from an overall increase in efficiency due to a more stable working force and more efficient procedures.

In fiscal year 1952, contracts for 15,821 square miles of stereocompilation services, including some control, were awarded to commercial mapping organizations. Of this total, about 6,000 square miles were completed in 1953 and 9,300 in fiscal year 1954, leaving about 500 square miles to be done to complete the contracts. The work of completing the testing of the maps and acceptance of all contract work should be finished during the first quarter of fiscal year 1955.

Technical assistance was extended to other nations through agencies concerned with international cooperation under the Mutual Security Act of 1951 as amended. This included the assignment of specialists in photogrammetry and topographic mapping to Burma, as well as the training of foreign technicians and the supervision, inspection, and testing of map compilation. In addition, the Division provided technical advice on mapping and photogrammetry to these agencies and to the United Nations.

### *Mapping Programs and Map Production*

Mapping or map revision was carried on during the year in all the 48 States and in Alaska, Puerto Rico, the Virgin Islands, and the Hawaiian Islands. Federal-State cooperative programs, whereby mapping costs are shared equally between the Federal Government, and a State, county, or municipality, were conducted in the 30 States of Arizona, Arkansas, California, Colorado, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nevada, New York, North Dakota, Ohio (Mahoning County), Oklahoma (Tulsa County), Pennsyl-

vania, Tennessee, Texas (city of Austin), Utah, Vermont, Virginia, Washington, and Wisconsin, and in Puerto Rico. Arizona is a recent addition to the list, having last participated in cooperative mapping in 1927. The Survey also continued to cooperate with the Tennessee Valley Authority in completing the topographic mapping of the valley. This work has no relation to the Tennessee State cooperative program, which includes only those areas outside of the Tennessee River basin.

During the year new defense requests were received from the Air Force for the mapping of 70 military bases, requiring some 40,000 square miles of new mapping. While these new requests will further delay the mapping of some areas for which there are urgent civilian requirements, the mapping of Air Force bases will also serve to provide maps needed in connection with the nonmilitary development problems that may arise in the highly populated areas adjacent to some of the bases. The civilian needs, as reported by Federal agencies and State advisory committees, are being coordinated and weighed so that, as the mapping for defense requirements continues to slacken, new mapping programs may be begun in those areas representing the greatest civilian need for topographic mapping.

A bright spot in the meeting of civilian requirements is the cooperative mapping program of the Federal Government and the State of Kentucky. This program, providing for the preparation of uniform statewide coverage of 7½-minute topographic maps at the scale of 2,000 feet per inch, is now in its fifth year and about 90 percent complete. A total of 328 of these maps have been published, and advance copy is available for most of the other areas of the State, as well as aerial photography for the entire State.

Mapping in the Territory of Hawaii was continued for the publication of topographic maps at the scale of 1:24,000. Operations during the year were conducted on the islands of Oahu, Molokai, and Maui on a total of 31 quadrangles covering an area of 1,360 square miles. Four of the five quadrangles covering the island of Molokai have been published and the fifth is nearing completion. It is planned to extend this mapping program to the island of Hawaii at an early date.

In Alaska, the accelerated mile-to-the-inch mapping program was continued, but the scale of operations was reduced somewhat. This accelerated program was begun 3 years ago in accordance with military requirements. This series of maps will also provide long-needed detailed terrain information for civil improvements, such as pulp and lumber operations, transportation routes, power developments, and mineral investigations.

Mapping on this scale (1:63,360) was continued on 409 Alaskan quadrangles covering an area of about 80,000 square miles. Actual



accomplishment, in terms of stereocompilation, was about 20,000 square miles, and 90 quadrangle maps were published, bringing the total of published maps of this series to 233.

Revision was begun on some of the 1:250,000-scale topographic maps of the provisional series of Alaska where new mile-to-the-inch mapping has been completed. Revision of the popular Alaska Map E, scale 1:2,500,000, was also begun.

In order to expedite the large-scale mapping program in Alaska, a coordinated program was worked out with the Department of Defense under which the 30th Engineers performed all of the field surveys in certain areas required for the Geological Survey compilation of 1:63,360-scale maps. Preliminary discussions have taken place concerning the possible extension of this type of cooperation for areas in the United States.

A mapping program was begun in the Virgin Islands in cooperation with the Office of Territories. Aerial photography has been received, and control surveys are in progress for the preparation of topographic maps to be published at the scale of 1:24,000.

Under a new cooperative agreement with the Department of Public Works of the Commonwealth of Puerto Rico, a program for revising the 1:30,000-scale topographic map series of Puerto Rico has been initiated. To carry out this program a resident engineer has been established in Puerto Rico, with headquarters in San Juan, to direct the continuous revision of these maps.

At the present time about 16,000 published topographic quadrangle maps are available. Many of these maps produced in earlier years are in need of revision to maintain their maximum usefulness. At the time these maps were produced they adequately portrayed the terrain and cultural developments and they have served effectively, but the rapid development of the country in recent years, with the construction of highways, urban expansion and attendant man-made changes, has greatly reduced the usefulness of these maps. By a program of revision and the expenditure of less than 10 percent of the cost of new mapping, most of these maps can be brought back to full value and maximum usefulness. Such a program, on a continuing basis, is proposed. The revision project in Puerto Rico, which is set up as a continuous program under a resident engineer, represents the type of solution contemplated for this problem.

Publication and distribution of a civil edition of the 1:250,000-scale maps of the United States were continued. These maps constitute a provisional series of 468 sheets being compiled by the Department of Defense (Army Map Service) for military purposes. Publication of the civil edition will provide reconnaissance topographic maps of many areas for which no topographic information of any kind has heretofore

been available to the general public. One hundred twenty-two maps of this civilian edition have been published and are now available, including five maps covering the Hawaiian Islands.

A new base map for the State of California at the scale of 1:500,000 was published, and similar base maps for Missouri and New Mexico are in the proof stage. Base maps on the 1:500,000 scale for New York, Oregon, Pennsylvania, Tennessee, and Colorado are in various stages of compilation, and similar maps for Arizona, North Carolina, and Virginia have been authorized. State maps at the 1:1,000,000 scale were published for the States of Indiana, Wyoming, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut, and a similar map of California is nearing completion.

To provide the framework for topographic mapping and for other engineering purposes, 11,580 miles of monumented lines of third-order leveling were completed during the year, together with 5,474 miles of transit traverse and a comparable amount of third-order triangulation. The results of such control surveys are available to the public.

In 1954, contracts were let for 112,509 square miles of precision aerial photography for topographic mapping purposes. This represents an increase of about 41,000 square miles over the amount of photography for which contracts were made in the previous fiscal year. In addition, arrangements were made with the Air Force to procure a quantity of aerial photography for use in compiling maps of a number of Air Force bases within the United States. The Navy Department and the Air Force deployed photographic crews to Alaska to obtain additional coverage necessary for the cooperative program of mapping in Alaska.

During the year, photography of more than 115,000 square miles was completed and delivered. Some of this work had been contracted for in the previous fiscal year. The unit cost of the aerial photography was 21 percent less than the cost in fiscal year 1953.

The Special Maps Branch continued to prepare charts for the United States Air Force Aeronautical Chart and Information Center, and special maps for other agencies of the Federal Government. The work for the Air Force consists of the photogrammetric compilation and revision of base charts, and the scribing of color-separation negatives preparatory to lithographic reproduction. These charts are an integral part of the national defense program, as well as the overall program of the Air Force for the production and maintenance of adequate worldwide coverage of aeronautical charts. About 240 assignments were completed. These included the compilation of 52 charts covering about 268,000 square miles, the preparation of 26 shaded relief plates, the scribing of color-separation negatives for 47 charts, and the completion of 115 other special assignments. The 52 charts compiled included 213,000 square miles of entirely new photocompilation and 55,000 square miles of revision and cartographic compilation. These

projects covered areas in practically every part of the globe. In addition, the Special Maps Branch completed 27 special assignments for other governmental agencies. Of these, 15 were compilation of maps covering approximately 5,000 square miles for the Geologic Division, the Atomic Energy Commission, and the Office of Naval Petroleum Reserves, and 7 were color-separation scribing for the United States Air Force, the Geologic Division, and the Mutual Security Administration. The Special Maps Branch also performed the color-separation drafting of the Water Resources Development Map of the United States.

New mapping and map revision in the United States (excluding Alaska) for each of the major phases of mapping activity are as follows:

	New map- ping (square miles)	Map re- vision (square miles)	Total (square miles)
Photography .....			115, 400
Horizontal control .....			71, 000
Vertical control .....			54, 700
Supplemental control .....			66, 550
Stereocompilation (including 9,300 square miles by contract) .....			75, 800
Field compilation .....	81, 125	17, 600	98, 725
Drafting .....			84, 100
Transmitted for reproduction .....	120, 150	12, 600	132, 750

In addition, relief shading was completed for 10 quadrangles and 3 State maps.

The total opposite each phase in the foregoing tabulation represents approximately the annual accomplishments of the Division. Variations in these totals are due to changes in backlogs and to work done on projects in which only certain phases of activity were concerned. In the fiscal year, work was in progress on 6,000 quadrangles. It usually requires from 2½ to 5 years to survey a quadrangle and publish the map of it.

Topographic maps forwarded for reproduction total 1,436. Of these, 1,146 were 7½-minute quadrangles, 289 were of the 15-minute series, and 1 was a 30-minute quadrangle. In addition, the Division prepared reprint editions of 647 quadrangle maps, 26 State base maps, and 58 State index maps. At the close of the fiscal year, 717 maps were in process of reproduction, including 227 reprints. During the year, 1,975 quadrangle maps were published, including 598 reprints. Of the 1,377 new and revised maps, 51 were compiled by the Tennessee Valley Authority, United States Coast and Geodetic Survey, and Forest Service, and 195 were civil editions of Army maps previously compiled for military use. In keeping with established policies, the topographic map material produced by these agencies is published and distributed to the general public by the Geological Survey.



A detailed summary of production covering new mapping, remapping, and revision, is shown in the following table:

*Areas (in square miles) mapped during fiscal year 1954 for publication on standard scales*

[Contour intervals, 5 to 100 feet]

State	Area mapped, scale			New mapping	Revised mapping	Total
	1:24,000	1:31,680	1:62,500			
Alabama.....						
Arizona.....	3		1,320	585	738	1,323
Arkansas.....	61					61
California.....	9,205		6,107	10,276	5,036	15,312
Colorado.....	1,065			1,065		1,065
Connecticut.....		1,101		439	662	1,101
Delaware.....	637			381	256	637
District of Columbia.....						
Florida.....	4,788			4,788		4,788
Georgia.....	841			841		841
Idaho.....	193		1,320	1,513		1,513
Illinois.....	1,959		469	1,501	927	2,428
Indiana.....	1,941		6	1,647	300	1,947
Kansas.....	174			174		174
Kentucky.....	12,146			12,146		12,146
Louisiana.....	676		506	1,182		1,182
Maine.....	138		1,600	710	1,028	1,738
Maryland.....	996			122	874	996
Massachusetts.....		689			689	689
Michigan.....	564		757	1,237	84	1,321
Minnesota.....	1,248		1,044	2,292		2,292
Mississippi.....			617	617		617
Missouri.....	758			704	54	758
Montana.....	761		18	779		779
Nebraska.....	1,374			1,374		1,374
Nevada.....	125		1,970	2,060	35	2,095
New Hampshire.....	28		573	534	67	601
New Jersey.....	1,924			48	1,876	1,924
New Mexico.....	2,908		104	3,012		3,012
New York.....	3,437		1,547	4,584	400	4,984
North Carolina.....	149		760	760	149	909
North Dakota.....	647			647		647
Ohio.....	1,855			1,855		1,855
Oklahoma.....	58			58		58
Oregon.....	411		2,789	3,200		3,200
Pennsylvania.....	1,815		2,318	2,017	2,116	4,133
Rhode Island.....		36			36	36
South Carolina.....						
South Dakota.....	3,070		76	3,146		3,146
Tennessee.....	887			887		887
Texas.....	544		3,609	4,153		4,153
Utah.....	615		3,064	3,679		3,679
Vermont.....			1,397	214	1,183	1,397
Virginia.....	594		798	921	471	1,392
Washington.....	1,876		3,805	5,061	620	5,681
West Virginia.....	2			2		2
Wisconsin.....	546		586	1,132		1,132
Wyoming.....	3,470		25	3,495		3,495
Total.....	64,489	1,826	37,185	85,899	17,601	103,500
Alaska.....			<sup>1</sup> 19,582	19,582		19,582
Puerto Rico.....		<sup>2</sup> 66		3	63	66
Hawaii.....	446			446		446

<sup>1</sup> Mapped on a scale of 1:63,360.

<sup>2</sup> Mapped on a scale of 1:30,000.

### Research and Development

Culminating a decade of photogrammetric research, the Survey has adopted newly developed equipment for using twin low-oblique photography and will begin countrywide use of it late in 1954. The principal instruments which make twin photography feasible are the ER-55

(ellipsoidal reflector projector of 55 mm. principal distance) and the Twinplex plotter. Prototypes of these instruments and related auxiliary equipment were designed and developed in the Survey's Staff Photogrammetry Section for these two principal purposes: to lessen the amount of ground-survey work required as compared to that required for mapping from conventional vertical photographs, and to give greater accuracy by widening the angle of intersection of rays in the stereoscopic model. By fiscal year 1956 many twin low-oblique photography mapping projects will be underway in each region, and it is expected that eventually most of the photography for all conventional mapping will be of the twin low-oblique type.

Perfection of the twin low-oblique photogrammetric method has been attained by an integrated program of research and development in photogrammetric mapping which includes the following major elements:

(1) Use of twin low-oblique photography instead of the conventional vertical photography. Twin low-oblique photography has inherent advantages that can lead to substantial economies, if suitable instruments are available for its use. By June 30, 1954, about 9,000 square miles of twin low-oblique photography was under contract, and photography of 2,300 square miles had been delivered.

(2) Development of photogrammetric plotting instruments suitable for using twin low-oblique photography. This development has been two-fold: the ellipsoidal reflector (ER-55) projector was developed to provide an efficient solution of the optical and mechanical problems posed by twin low-oblique photography; and the Twinplex plotter was developed as a means for extending control for mapping with twin low-oblique photography, using ER-55 projectors in coupled pairs. The ER-55 projector also provides a greatly improved means of utilizing conventional vertical photography. Contracts for the fabrication of ER-55 projectors and Twinplex plotters were let and the first commercially built models were approaching completion at the year's end, with complete delivery in prospect for the fall of 1954.

(3) Development of improved diapositive printers for printing at each of the three principal reduction ratios: 153:30, 153:55, and 153:153. These printers utilize aspheric correction plates for compensating aerial camera distortion. Two 153:55 printers, needed for use with the ER-55 projectors, will be delivered in the summer of 1954.

(4) Procurement of high-precision aerial cameras of the latest design, featuring a virtually distortion-free lens and several mechanical improvements. Ownership of these cameras by the Survey assures adequate control of their technical characteristics. Ten of these cameras have been delivered.

(5) Installation of a multi-collimator camera calibrator to permit expeditious testing and calibration of aerial cameras used in work of the Geological Survey. This equipment was completely delivered in fiscal year 1954.

(6) Development of a precision pantograph to permit the compilation of map detail at or close to the publication scale. Pantographs for use with Kelsh plotters are scheduled to be delivered in the summer of 1954, and some for use with Multiplex and ER-55 instruments are scheduled for fall delivery.

(7) Development of techniques and procedures for using the new equipment, including the publication of instructions and scientific papers.

Further progress was made toward the integration of negative engraving, or scribing, to replace the drafting process in map-finishing operations. This has involved the development and refinement of instruments of various kinds, improvement of engraving emulsions, and continuous search for better materials and methods. It is expected that the orderly conversion of all drafting offices to the negative scribing process can be completed during the next fiscal year.

In view of the advantages indicated for the scribing procedure in map finishing, experiments with its application at stereo-compilation and field-survey stages have been undertaken. Results have been generally favorable and steps are now being taken for the gradual conversion of stereomapping and field-survey procedures to scribing. The benefits expected therefrom are associated with, and interdependent upon, the endeavor to simplify the mapping process as a whole. This involves the plotting of basic data at reproduction scale, or as close thereto as feasible, which, in turn, requires special supplementary equipment and some reorganization of personnel and procedures. Completion of the conversion will therefore probably require 1 or 2 years, but the prospects of ultimate simplification of the mapping cycle, time reductions, and overall saving clearly justify this effort.

The Special Maps Branch has achieved considerable success in extending horizontal control through the use of the stereotemplate method whereby fewer points are required to control any given area. Since the completion of an experiment in an area in Louisiana, the method has been used in other areas where the flight pattern of the photography, the ruggedness and inaccessibility of terrain, and the scarcity of existing horizontal control precluded the achievement of an equally accurate solution by other techniques.

A joint committee of the Geologic and Topographic Divisions was organized for the purpose of exploring means of applying photo-



grammetric methods to operations of the Geologic Division. Among the measures recommended by this committee was the establishment of a training course for geologists in the use of photogrammetric techniques as related to photointerpretation and cartography in the field of geology. Two such courses were conducted in the spring of 1954, and other courses were planned for the fall.

Twelve more chapters of the Topographic Manual were published during the year, bringing the total to 42. Sixty-seven chapters are in various stages of preparation, and it is estimated that the project is about 50 percent complete.

A detailed study of appropriate contour intervals for use in planning future mapping was continued on a State-by-State basis. Four State plans have been completed and approved and ten others are currently in progress.

### *Map Information Office*

Public use of the facilities of the Map Information Office continued to increase considerably during the year but there was not so great an increase as in the previous year. Nevertheless, nearly 60,000 requests for maps, geodetic control data, and aerial photographs, or related information, were serviced.

New map files have been installed and storage facilities are now available for more than 100,000 maps. The fourth edition of the index map showing the status of topographic mapping in the United States was issued. Many requests for geodetic control data resulted in the distribution of about 15,000 copies of horizontal and vertical control data assembled in 15-minute-quadrangle units. Large requests were primarily from geologic and geophysical survey companies and aerial photomapping firms.

Aerial photography sales of 144,525 reproductions amounted to \$87,875, an increase of about 40 percent over the previous year.

Three new training films were delivered to the Map Information Office for circulation: Supplemental Control for Topographic Mapping, Triangulation for the Control of Topographic Mapping, and Negative Scribing for Map Reproduction.

In cooperation with the four regional offices, the Map Information Office supplied 78,000 copies of preliminary map manuscripts. Most of the requests for these were from oil companies and from consulting engineers or mapping contractors interested in new turnpike planning, uranium and oil exploration, and microwave propagation studies. A constant interchange of map, control, and photographic information with other Federal agencies also was conducted.

## WATER RESOURCES DIVISION

Water has often been referred to as "our Nation's most important natural resource." It is also one of our most elusive resources. In streams and underground it is constantly varied through operation of the circulating system whereby water in the sea and on the land is transferred to vapor in the air and is then precipitated back upon the earth. This process is continuous, but because the rate varies, the water supply in any one locality is always changing. Those with an expert knowledge of water agree that the United States should know much more about its water supply and its water requirements and that a proper, scientific, and systematic appraisal of our water resources is necessary for the wise development of our economy. This appraisal is the work of the Water Resources Division of the Geological Survey. Throughout the Nation the Geological Survey, in cooperation with the 48 States and other Federal agencies, is planning, working on, and completing investigations designed, eventually, to locate and describe our water resources. These investigations will determine the amount of water available, the quality of the supply, the areas it serves, and the extent it can be developed without depleting the supply or impairing the quality.

Water-resources investigations are financed from directly appropriated funds, funds transferred from other Federal agencies for work performed directly for them, and from funds provided by States and municipalities for cooperative investigations. Funds made available by States and municipalities in 1954 for cooperative studies were:

State:	Obligations	State:	Obligations
Alabama -----	\$76, 234	New Hampshire -----	\$17, 891
Arizona -----	108, 914	New Jersey -----	80, 182
Arkansas -----	52, 994	New Mexico -----	130, 188
California -----	316, 835	New York -----	210, 527
Colorado -----	56, 115	North Carolina -----	88, 662
Connecticut -----	22, 309	North Dakota -----	36, 348
Delaware -----	17, 588	Ohio -----	128, 748
Florida -----	135, 298	Oklahoma -----	72, 831
Georgia -----	61, 002	Oregon -----	67, 912
Idaho -----	57, 325	Pennsylvania -----	120, 178
Illinois -----	49, 240	Rhode Island -----	14, 804
Indiana -----	108, 057	South Carolina -----	27, 957
Iowa -----	80, 211	South Dakota -----	10, 248
Kansas -----	57, 629	Tennessee -----	85, 679
Kentucky -----	145, 405	Texas -----	247, 083
Louisiana -----	93, 817	Utah -----	103, 142
Maine -----	10, 972	Vermont -----	8, 010
Maryland -----	80, 985	Virginia -----	82, 788
Massachusetts -----	43, 556	Washington -----	111, 746
Michigan -----	93, 569	West Virginia -----	23, 735
Minnesota -----	86, 685	Wisconsin -----	41, 338
Mississippi -----	40, 650	Wyoming -----	49, 389
Missouri -----	32, 814	Guam -----	18, 658
Montana -----	33, 100	Hawaii -----	82, 172
Nebraska -----	71, 514		
Nevada -----	30, 376	Total -----	3, 823, 410

Water-resources investigations are carried on by 102 principal field offices which, for administrative and reporting purposes, operate as parts of the Surface Water, Ground Water, or Quality of Water Branches. A comprehensive investigation of water resources requires the coordinated activities of these Branches.

### *Surface-Water Investigations*

The task of measuring the flow of even a few of the Nation's streams is a large one which requires the collection of a vast amount of statistical data.

Records of stream discharge were collected at 6,400 gaging stations in the 48 States and in Alaska, Hawaii, and Guam during fiscal year 1954. The stations were operated through 44 district offices, in cooperation with 187 agencies of States and their political subdivisions and with 15 Federal agencies. These records are published in the annual series of water-supply papers entitled "Surface Water Supply of the United States."

The Federal Power Commission requires licensees operating major hydroelectric-power generating systems to measure the flow of streams used in producing power. At the request of the Commission the Geological Survey supervised stream gaging on nearly 200 licensed projects during 1954.

The making of one compilation of all streamflow records in the United States, begun in 1952, was 45 percent complete at the end of 1954. This project consists of reviewing, revising, and condensing all streamflow records collected before 1950. The complete records for any given gaging station will be summarized in one volume. During the year, 2 of the 20 volumes were completed and sent to the printer; these were for the Colorado River basin and the New England area.

Four flood reports were published during the year, and three others were completed and delivered to the Government Printing Office. Four reports relating to water resources of specific areas were released to cooperating State agencies for publication. The results of a laboratory study of flow through bridge openings was published as Geological Survey Circular 284, Computation of Peak Discharge at Contractions. A flood-frequency report for Iowa, prepared cooperatively by the Geological Survey, was published by the Iowa State Highway Department.

The number of cooperative agreements with State highway departments was increased during the year. Hydraulic data on 86 sites where bridges are to be built were furnished to various State highway departments. Flood-frequency studies were in progress at the end of the year in 9 States; studies were completed in 2 other States, and re-



ports are in process of publication. The program of collecting flood-flow data on small streams by means of crest-stage gages is being augmented continuously.

Streamflow data are generally required as the bases for the apportionment and division of interstate waters. Eleven interstate compacts providing for such apportionment are now in effect and three are under negotiation. These compacts include provisions for the establishment and operation of gaging stations, usually by the Geological Survey.

The Geological Survey, using funds transferred by the Department of State, made water-resources investigations along the Canadian boundary that are required by the Boundary Waters Treaty of January 11, 1909, between the United States and Canada, or by orders issued by the International Joint Commission.

### *Ground-Water Investigations*

Investigation of the ground-water resources of the Nation was continued throughout the fiscal year. In addition to the 43 State cooperative programs there were more than 30 other projects for study of ground-water problems that are primarily of national interest or of direct concern to some other Federal agency.

Programs of national interest that were begun or continued in the year include, among others, research on artificial recharge in Arkansas, designed to produce information that will make this method of ground-water replenishment more practical under conditions now considered too difficult; studies of the hydrology of mining areas in Alabama, Arkansas, Tennessee, Pennsylvania, Michigan, Wisconsin, and Nevada, designed to produce fundamental information enabling economical dewatering of mines now too "wet" to work profitably; a reconnaissance of the Nation to outline areas where saline ground waters will be available for demineralization by the various water-desalting techniques now being studied by several scientific agencies and universities; study of water-loving plants in the arid West to determine where they waste water that can be salvaged for useful purposes; and study of ground-water movement in deep aquifers and its effect on the accumulation of oil and gas. These studies, even where limited to given geographical areas, have nationwide application.

Continuing investigations of particular interest to agencies of the Federal Government include broad areal studies in Alaska, in central Arizona, in the Central Valley of California, in the Arkansas, White, and Red River basins, in the New England-New York river basins, on the island of Guam and in the Trust Territories of the Western Pacific, and in the Columbia River basin.

Other surveys and investigations have been conducted at the request of the Armed Forces, the State Department, the Agriculture Department, the Atomic Energy Commission, and various bureaus of the Department of the Interior.

During the year, 70 reports of ground-water investigations were published and 99 others were made available to the public by means of open-file release. The published reports consisted of 7 water-supply papers, 2 hydrologic atlases, 20 circulars, and one congressional document, 20 reports published by cooperating agencies, and 20 papers published in scientific journals. In addition, several reports were prepared for various Federal agencies.

### *Chemical-Quality Investigations*

All water, whether surface or ground water, contains some dissolved minerals, which may be a limiting factor in the uses to which the supply may be put. An integral part of the change water undergoes in its progress through the hydrologic cycle is the persistent alterations in the chemical quality. The type of material with which the water has been in contact and the length of time in contact govern the degree of mineralization and ultimately the use of the water. Water of unsuitable quality will affect adversely every phase of human living.

The object of the Survey's chemical-quality investigations is to determine the quantity and character of the mineral matter in solution in ground and surface waters as a prerequisite to the selection and development of industrial, municipal, and agricultural water supplies. The investigations involve an intensive and extensive sampling of ground- and surface-water sources and are conducted in close coordination with the studies of ground and surface waters in order to arrive at an understanding of the full potential of the water supplies in any area.

During the year, the chemical quality of more than 85,000 samples of water was determined in 15 laboratories situated in Washington, D. C., and throughout the country. The national program consisted of chemical-quality studies of the streams in the Colorado River, Pecos River, and Columbia River basins, in the New York-New England States, and in Alaska. Also Federal network sampling stations were maintained on western streams to determine trends in mineral content and thus help to insure successful operation of existing irrigation projects. Chemical-quality studies of surface waters were conducted in cooperation with various State agencies in 17 States. These programs include the daily collection of surface-water samples at 227 sites on streams. In addition, samples were collected on an inter-

mittent basis at nearly 200 stream-sampling sites. More than 6,000 samples were also collected and analyzed in connection with cooperative studies of ground water in those areas and in other States.

In the sound development of Federal projects and for the protection of Federal property, data on water quality are of increasing importance in order to provide a better understanding of the use of water for national defense, public health, agriculture, industry, and recreation. Analytical results, interpretation of analyses, or advice about water problems were furnished during 1954 to the following Federal agencies: Atomic Energy Commission, Department of the Navy, Department of the Army, Department of the Air Force, Maritime Administration, Public Health Service, Veterans' Administration, Bureau of Reclamation, Bureau of Mines, Public Housing Administration, Federal Works Agency, and Fish and Wildlife Service. Nearly 4,000 analyses were made at the request of these agencies; and nearly 1,600 of the samples analyzed were collected at defense installations in this country and at offshore bases.

Much public attention has been directed to the prospective use of demineralized saline waters for industrial and other purposes. Concerted efforts on the part of public and private agencies have produced results that are encouraging for the conversion of saline water, especially water of lower saline content than ocean water, to fresh water at a cost competitive with existing supplies in areas where the current price is substantially above average.

This raises the question, Where are the major sources of these inland saline waters? The Geological Survey is currently engaged in trying to find out. During 1954 two reports were partly completed: One deals with a reconnaissance study of the saline waters of the United States and will summarize existing information; the second covers in somewhat greater detail the saline water resources in Texas.

A program to determine radioactivity of water and interpret the occurrence of radioactive substances in waters throughout the United States entered the data-collection phases during the latter part of the year. An analytic laboratory to further this program was placed in operation.

### *Sediment Investigations*

Sediment transported by streams poses a problem in the design and operation of water-control structures. The useful life of such structures may be threatened in a few years by the deposition of sediment. The demand for construction of large dams to impound greater quantities of water in reservoirs for irrigation, power development, and industrial use, has focused attention on the probable useful life of these reservoirs.



Because the greater part of the sediment carried in streams is dropped in the reservoirs, it is essential that systematic studies be made to determine the quantities of sediment that will have to be taken into account in the construction of dams and in the operation of the reservoirs. The sediment-measurement studies involve to a considerable degree the determination of the sediment transported by a stream at a given site. In 1954, sediment samples were collected daily, or more frequently, at 127 sites throughout the Nation. The national program of sediment-transport studies was advanced in mainly the Rio Grande, Colorado, and Missouri River basins. Cooperative sediment studies were continued in the States of Kentucky, Ohio, Pennsylvania, and Virginia. In all, more than 50,000 sediment samples were collected and analyzed during the year in 15 laboratories throughout the country.

### *Missouri River Basin*

As a part of the coordinated Missouri River basin development plan, comprehensive investigations of the water resources of the basin were continued during the year. In general, these investigations were carried on at a reduced rate as compared to 1953.

### *Research*

The design of a high-speed electronic computer for processing surface-water records is practically complete and construction well under way by a private firm. It is expected that the computer will perform a large volume of work of a routine nature that has been performed manually.

Research is being conducted in both the field and laboratory on the technique of computing peak discharges through natural channels and new designs of hydraulic structures. Work on flow through bridge openings has been completed and the results published; work on flow through culverts and over dams is now in process.

A battery-powered electronic low-velocity flowmeter, built for the Geological Survey, was delivered near the end of the year. The meter is to be used for measuring flows which the standard mechanical current meter does not measure with sufficient accuracy. It is now being tested under field conditions.

Several noteworthy achievements in ground-water technology were made during the year. The development of numerical methods of analysis for the solution of complex quantitative ground-water problems was continued. The use of electrical models to solve ground-water problems involving complex boundary conditions was increased. These developments are growing out of a new conception that will

enable the water supply of ground-water reservoirs to be evaluated on an areal basis more easily and yet with more accuracy than heretofore. A working model of an electrical "slide rule" was constructed for quickly determining theoretical drawdowns caused by pumping. A new type of meter that appears to determine moisture content in soil more accurately than previous methods was tested for application to analysis of ground-water problems involving determination of movement of water through the unsaturated material above the water table.

Two field tests were made during the year to determine how radioactive wastes are dissipated when introduced into a stream. Disposal of radioactive wastes will become a major problem as use of atomic power increases, and one means of disposal is to discharge the wastes into surface waters. Research was continued on the development and refinement of techniques for collecting and analyzing water samples for radioactivity.

A study which has been made of the origin and development of meandering, braided, and straight natural stream channels has resulted in a number of generalizations concerning the formation of each type and in the prospect that they can be interpreted in terms of rational laws. These studies are important in the control and regulation of rivers, as well as in the broad field of geologic processes.

### *Industrial Water Supply*

Present-day industrial plants require immense quantities of water. In 1953, industries utilized about 45 percent of all water used, exclusive of that expended for development of water power. The water must be of suitable quality. Studies of the quantitative and qualitative water requirements of industry that were carried on in 1953 were continued in 1954 at the request of the Water and Sewerage Industry and Utilities Division of the Business and Defense Services Administration of the Department of Commerce. Field investigations of the water requirements of the carbon black industry were completed. Administrative reports for the use of defense agencies were begun on the rayon, acetate, nylon fiber, aluminum, and carbon black industries. A report on the water requirements of the pulp and paper industry was prepared for publication to serve the dual purpose of providing information for national defense planning and to render a valuable service to business and industry.

### *Water-Resources Evaluation*

At the request of the National Security Resources Board the Division is engaged in preparing integrated reports summarizing and evaluating water-resources information in specific areas. In 1954,

reports were published on six large industrial centers, and reports on eight additional centers were in progress. The reports are designed to supply answers to questions on industrial, municipal, and rural water supply, flood protection, and pollution control. All available water-resources data are summarized, interpreted, and evaluated for the areas, including location, quantity, quality, temperature, and utilization of both ground-water and surface-water supplies, flood and low-flow frequencies, flood profiles, and effects of existing and proposed reservoirs.

### *Technical-Assistance Program*

Water-resources investigations and training of foreign nationals under terms of the Mutual Security Act were continued as a part of the Foreign Operations Administration program in India, Iran, Saudi Arabia, Afghanistan, and Libya, and additional personnel were assigned to the last two countries. New ground-water investigations were begun in Egypt and Pakistan.

Nationals of India received training in domestic field offices.

Under the auspices of the United Nations, a preliminary water-resources investigation was made in Jamaica, and surface-water studies in cooperation with the Geological Survey of Jamaica are now in progress.

### *Soil and Moisture Conservation*

The soil- and moisture-conservation program provides the facts needed to protect water supplies on Federal lands of the West under the custody of the Department of the Interior and to maintain the productivity of these lands. During 1954 the Survey's program included prospecting for and discovery of new sources of range-water supplies on public lands in the arid and semiarid areas, thus permitting better utilization of these lands. Investigations that were begun in 1952 to determine the rate at which reservoirs were being filled with sediment, as a measure of the erosion taking place upstream, were continued in 1954. These surveys also showed the extent to which water was wasted by evaporation. Results of the Lake Hefner, Okla., investigation to develop basic methods for measurement of evaporation from reservoirs were published in 1953. The principles of this successful research are being applied at Lake Mead, the key reservoir in the management of lower Colorado River. Studies are under way near Fairbury, Nebr., to determine whether similar principles can be applied to the measurement of water lost by vegetation through evaporation and transpiration.



## CONSERVATION DIVISION

The Conservation Division classifies Federal lands as to mineral and water resources and supervises mineral-recovery operations under leases, permits, and licenses on Federal, Indian, and naval petroleum reserve lands. A small headquarters staff and a field staff of competent geologists and engineers are maintained. This force makes field surveys, prepares maps and reports dealing with waterpower, fuels, minerals, and chemicals essential to the mineral-resource economy of the United States, and conducts onsite supervision of mining and drilling operations necessary to assure the safe and economical production by private enterprise of coal, oil, gas, and other minerals.

*Mineral Classification Branch*

All services rendered by the Mineral Classification Branch were maintained at a continued rapid pace throughout the fiscal year 1954. In all, 21,721 cases were acted upon. They concerned the outright disposal of Federal lands with no reservation of any mineral, the disposal of such lands with the reservation of one or more specified minerals, or the exercise under the Federal leasing laws of the Government's right to lease for exploration and production by private enterprise, one or another mineral substance from lands under its jurisdiction. In addition, the Branch prepared and promulgated initial or revised definitions of the known geologic structure of 52 producing oil and gas fields containing Federal lands; appraised geologically 215 unit-plan and participating-area proposals; drafted 9 determinations of leasehold relations to the productive limits of producing oil and gas deposits as found to exist on August 8, 1946; reported for appropriate administrative action the fact and geologic significance of 150 new discoveries of oil or gas made on or affecting Federal-land leaseholds; recommended the competitive sale of oil and gas leases on 31 parcels of public land; reviewed and reported upon 16 appeals from decisions of the Bureau of Land Management affecting the disposal of Federal lands; and prepared 128 miscellaneous reports on the mineral potentialities of specific lands for various agencies of the Federal Government and inquiring individuals.

From field offices in Colorado, California, Montana, New Mexico, Oklahoma, Utah, and Wyoming, Branch and district geologists made "demand" or specific investigations which resulted in geologic reports and maps for official use. The Branch completed reports on the coal resources of Rifle Gap coal district, Colorado; on the oil and gas resources of Middle Dome-Kettleman Hills, Williams, and Republic areas, Midway field, and Wheeler Ridge, Calif.; Twin Buttes gas field, and Clear Creek gas field, Colorado; Block 36 gas field, Grand Bay

field, Romere Pass field, and East Greenwood field, Louisiana; Greenwood field, Kansas; East Popular field, Montana; six fields in southeast New Mexico; East Orlando field, Oklahoma; Sussex-Meadow Creek field, and West Salt Creek field, Wyoming; on sodium classification at Searles Lake, Calif., and in the Green River Basin, Wyo.; on occurrences of phosphate rock at Buck Creek, Wyo., Bear Creek, Idaho, and Midway, Utah; on the occurrences of lead, zinc, and iron deposits in the Clark National Forest, Mo.; and on geology of dam and reservoir sites on the Chowchilla River, Calif.; and on the Eileen and Meadow Creek dam sites on the Moyie River, Idaho; maps showing classifications of oil and gas lands in California, Colorado, Nebraska, New Mexico, South Dakota, and Utah; and a special report on structure and oil and gas occurrences in southeast New Mexico.

### *Water and Power Branch*

The Water and Power Branch conducts investigations to determine potential waterpower possibilities, classifies public lands having value for development of waterpower projects, and works closely with other bureaus and agencies in administration of the public lands so classified. These duties are carried out from a central and regional office in Washington, D. C., and from regional offices in Denver, Colo., Sacramento, Calif., Portland, Oreg., and Tacoma, Wash. Investigatory work in Alaska is directed from Tacoma. Field work during 1954 was directed mainly toward obtaining basic information on the waterpower resources and storage possibilities of Federal lands in Alaska, California, Colorado, Idaho, Montana, New Mexico, Oregon, and Washington. Field projects during the year included surveys on the Kenai, Kasilof, and Seldovia Rivers, Alaska; Klamath, North Yuba, Sacramento, McCloud, Chowchilla, and Scott Rivers, Calif.; Navajo and Arkansas Rivers, Colo.; Moyie River, Idaho; Yaak River, Mont.; Navajo River, N. Mex.; South Fork Coos, Wilson, and Trask Rivers, Oreg.; and Wynoochee River, Wash. In all, 280 channel miles of stream and 11 dam sites were mapped during the year or were under investigation on June 30, 1954. Maps of 98 channel miles of stream and 10 dam sites were published during the year; maps awaiting publication on June 30 include 170 channel miles of stream and 5 dam sites; maps in the office stage of preparation on June 30 include 70 channel miles of stream and 4 dam sites. Four reports were published as circulars and seven reports were in preparation for publication on June 30. They include an appraisal of waterpower possibilities of streams in Alaska, California, Colorado, Idaho, Nevada, and Oregon. Classification activities resulted in the addition of 225,137 acres to power site reserves and elimination of 4,030,

increasing the outstanding reserves in 23 States and Alaska to a net total of 7,163,559 acres. Upon request from the Federal Power Commission supervision was given to power projects under license and to 757 such projects under permit or grant from the Department of Interior, and to 203 in cooperation with the Bureau of Indian Affairs. Action involving hydraulic determination was taken on 5,806 cases received from departmental sources and the Federal Power Commission.

### *Mining Branch*

The Mining Branch supervises operations concerned with discovery, development, and production of coal, potassium, sodium, phosphate, and oil shale from public domain lands; of sulfur on public lands in Louisiana and New Mexico; of silica sand on certain lands in Nevada withdrawn by Executive Order No. 5105; of gold, silver, and mercury on certain Spanish land grants; of all minerals, except oil and gas, on restricted allotted and tribal Indian lands, on "acquired lands" under the act of August 7, 1947, and provisions of section 402 of the President's Reorganization Plan No. III of 1946, on land in the California State Park under the act of March 3, 1933 (47 Stat. 1487), and on national forest land in Minnesota under the act of June 30, 1950 (64 Stat. 311). Outstanding mineral leases and permits on "acquired" and Indian lands and lands subject to the aforementioned acts involve the exploration for and production of aluminum, cobalt, copper, gold, iron, lead, manganese, silver, nickel, titanium, tungsten, uranium, vanadium, zinc, asbestos, bentonite, clay, coal, garnet, gravel, gypsum, feldspar, fluorspar, limestone, marble, mica, phosphate, pumice, quartzite, quartz crystal, sand, silica sand, sulfur, and vermiculite.

The Branch is responsible for investigations and reporting on applications for leases and prospecting permits; recommending lease terms, enforcing compliance with lease terms and of regulations governing the conduct of prospecting, mining, and beneficiation; protecting and conserving the natural resources by preventing waste; determining royalty liability; preparing statements and receiving payment of royalties and rentals. The Branch also acts in an advisory capacity to the Office of the Secretary, other bureaus of the Department, and other Government agencies. As of June 30, 1954, there were under supervision 1,462 properties involved in leases, permits, and licenses in 32 States and Alaska, of which 867 were on public lands; 199 on acquired lands; and 396 on Indian lands.

Production from such lands under supervision during the fiscal year is estimated at 17,920,676 tons, valued at \$119,396,653, with royalties amounting to \$4,482,876. The production of coal from Fed-



eral land in the United States and Alaska aggregated 7,185,482 tons. Production of coal in Alaska was 800,700 tons. Potash production amounted to 7,481,000 tons of crude salts valued at \$52,196,000 and having royalty value of \$2,049,000. The principal source of sodium was Searles Lake, Calif.; it accounted for 564,655 tons of the total of 662,762 tons of sodium and associated compounds produced from lands under supervision. Phosphate rock and shale production was 1,329,145 tons—545,381 tons from public domain, 4,816 from acquired lands, and 778,948 tons from Indian lands. Production of lead and zinc concentrates from Indian lands amounted to 15,400 tons valued at \$1,578,000 and having royalty value of \$135,250. The output of uranium and vanadium ores from Indian lands was 168,693 tons valued at \$5,783,310 and having royalty value of \$619,664. Phosphate, coal, and sand and gravel made up the major part of the rest of the production from Indian lands, totaling 1,759,617 tons valued at \$9,527,080 and having royalty value of \$880,221. Coal, fluorspar, zinc, asbestos, bentonite, phosphate, mica, quartzite, quartz crystals, stone, and sand and gravel were produced from acquired lands in 10 States to an aggregate of 225,480 tons valued at \$2,276,884 and having royalty value of \$76,800.

### *Oil and Gas Leasing Branch*

The Oil and Gas Leasing Branch supervises operations for the discovery, development, and production of crude oil, natural gas, and products extracted from natural gas on Federal and Indian lands. These duties were carried out during the year by means of 5 regional offices and 20 district offices at 19 separate locations in California, Colorado, Louisiana, Montana, New Mexico, Oklahoma, Utah, Wyoming, and Washington, D. C. On the public lands 87,531 oil and gas properties were under supervision at the end of the fiscal year, aggregating 65,959,426 acres in 23 States and Alaska. Drilling on public lands during the year included the spudding of 1,524 wells and the completion of 1,503 wells, of which 1,097 were productive of oil or gas. In all, 20,403 wells, including 11,587 capable of oil or gas production, were under supervision on June 30, 1954. Production was appreciably greater than in 1953, amounting to about 107,963,116 barrels of petroleum; 238,438,986,000 cubic feet of natural gas; and 200,765,386 gallons of gasoline and butane, with royalty returns to the United States of about \$37,801,929. There were 2,873 acquired land leases, embracing 2,758,629 acres in 29 States under supervision at the close of the fiscal year. Drilling on acquired lands during the year included the spudding of 74 wells and the completion of 81 wells, 39 of which were productive of oil or gas. In all 445 acquired land wells, including 222 capable of oil or gas production, were under

supervision on June 30. Including compensatory royalty allocated to the Rio Vista gas field, the production from acquired lands was about 4,919,000 barrels of petroleum; 2,757,269,000 cubic feet of natural gas; and 117,209 gallons of gasoline and butane, with royalty returns of about \$1,998,324.

The Branch supervised operations on 9,937 leaseholds, embracing 2,666,070 acres on Indian lands in 17 States, which contained at the end of the year a total of 8,314 wells, 4,431 of which were productive of oil or gas, and 387 of which had been completed in the year. The total revenue from royalties, rentals, and bonuses amounted to \$27,728,000. Outstanding on June 30 were 12 protective leases issued to protect from drainage Federal lands subject to leasing (national monuments, military reservations, etc.). Forty-six productive wells have been drilled on these leases, and royalty returns for the year were more than \$585,000. On behalf of the Department of the Navy, supervision was continued over the production of oil, gas, gasoline, and butane from 17 properties under lease in Naval Petroleum Reserve No. 2 in California. Production from 272 active wells in this reserve totaled 2,198,000 barrels of petroleum; 1,665,000,000 cubic feet of natural gas; and 9,668,000 gallons of natural gasoline and butane, with an aggregate royalty of \$949,000. Activities toward unitization of oil and gas operations involving Federal land were reflected in the approval of 80 new unit plans during the year and the termination of 48 previously approved unit plans, leaving 301 approved plans, covering 5,240,893 acres, outstanding. About 50 percent of the petroleum obtained from public lands during the year was produced under approved unit agreements, as were 23 percent of the natural gas and 59 percent of the gasoline and butane. No Indian land unit agreements were approved during the year, but a total of 11 such approved plans covering 87,320 acres were outstanding on June 30. Also, 120 drilling unit, or communitization, agreements were approved during the year, making a total of 386 approved as of June 30.

## WORK ON PUBLICATIONS

The primary purpose of the Geological Survey is to provide for the people and the agencies of Government information necessary for the exploration, development, and conservation of our mineral and water resources. As this information becomes available through investigations, surveys, and research, the fulfillment of this purpose is served by the publication of a variety of reports, maps, and charts. The information is published in part by the Survey and, in part, by cooperating States, and by many scientific journals. These publications include maps of the topographic and geologic features of the Nation,

studies of mining districts and mineral deposits, of the composition and structure of rocks and minerals, of fossils and the rocks in which they are found, of geophysics and geochemistry, and studies of stream-flow and ground waters and their chemical quality. Those published in 1954 are summarized below.

*Reports, maps, and charts published in fiscal year 1954*

REPORTS

Division	Professional Papers	Bulletins and Water-Supply Papers	Circulars	Approved for publication in scientific journals	Approved for publication by cooperating agencies	Placed in open file	Special
Geologic.....	20	35	52	422	19	66	-----
Topographic.....				23		19	-----
Water Resources.....	1	30	22	44	32	<sup>1</sup> 104	2
Conservation.....			4				-----
Staff.....							13
Total.....	21	65	78	489	51	189	15

MAPS AND CHARTS

Division	Topographic quadrangle		Geologic	River survey	Special	Placed in open file	Approved for publication by cooperating agencies
	New	Reprinted					
Geologic.....			80			42	8
Topographic.....	1,537	384			<sup>2</sup> 354		-----
Water Resources.....				15	<sup>3</sup> 2	1	-----
Conservation.....							-----
Total.....	1,537	384	80	15	356	43	8

<sup>1</sup> Includes 20 reports approved for publication in scientific journals.

<sup>2</sup> Includes 267 maps and charts produced for publication by other agencies of the Government.

<sup>3</sup> Of the Hydrologic Atlas series.

### Section of Texts

The Section of Texts edits and prepares manuscripts for the printer, revises proof, and performs other duties in the publication of professional papers, bulletins, water-supply papers, and circulars. During the year, 225 new manuscripts were received, 234 manuscripts were sent to the printer, and 194 publications were delivered by the printer. Work on these included 21,334 pages of manuscript edited and prepared for printing; 3,287 galley proofs and 8,365 page proofs revised and returned; indexes prepared for 55 publications and totaling 12,370 entries. Copy edited in preparation for mimeographing included 90 pages of miscellaneous material.

Twelve lists of new publications were issued. Also printed during the year was Publications of the Geological Survey, 1953. Copy for the First Supplement to Publications of the Geological Survey, 1953 was prepared.



*Section of Illustrations*

Of a total of 64 reports on hand at the beginning of the fiscal year, 44 were in various stages of completion. Eighty-two new reports were received, making a total of 146 reports. Of these 85 were completed and transmitted for publication, as compared to 74 last year. This leaves 61 reports on hand, 55 of which are in various stages of completion.

Those transmitted included 37 professional papers, 29 bulletins, 16 water-supply papers, 2 hydrologic atlases, and 1 special map of Panama. These reports contained 2,168 drawings and photographs. Illustrations were prepared for 54 circulars which contained 368 drawings and photographs.

A grand total of 2,436 illustrations were prepared by the Section. In addition, many miscellaneous pieces of drafting were completed for other bureaus of the Department and Branches of the Survey.

*Map Reproduction*

The production of the Map Reproduction Branch increased more than one-third over the past fiscal year. The following is a summary of its accomplishments:

	<i>New</i>	<i>Reprinted</i>
<i>Topographic Division maps</i>		
Standard topographic.....	<sup>1</sup> 1,474	133
Standard topographic (enr.).....	6	251
1:250,000-scale.....	<sup>2</sup> 33	-----
Scale conversion.....	24	-----
Planimetric.....	22	64
State base.....	15	14
State topographic index.....	46	-----
Status index.....	3	-----
Miscellaneous.....	1	3
<i>Geologic Division maps</i>		
Geologic quadrangle.....	16	-----
Mineral investigation.....	5	-----
State geologic index.....	4	-----
Coal.....	7	1
Oil and gas.....	20	20
Oil and gas charts.....	3	-----
State geologic.....	-----	7
Geophysical investigation.....	14	1
Geologic status.....	2	-----
Miscellaneous.....	9	5

<sup>1</sup> Includes 24 printed by other Government agencies.

<sup>2</sup> Printed by other Government agencies.

<i>Conservation Division maps</i>		
River survey.....	15	-----
Miscellaneous.....		----- 1
<i>Water Resources Division maps</i>		
Miscellaneous.....	2	-----
Total.....	1,721	500

These 2,221 new and reprinted map editions comprise 5,740,852 copies and 30,245,194 impressions, of which 5,597,852 copies and 29,387,194 impressions were printed in the Survey's plant. These maps range in size from 17 by 21 inches to 50 by 72 inches.

In addition to the foregoing production, 1,008 jobs comprising miscellaneous maps and other preliminary map services were completed. This printing amounted to 488,572 copies and 2,397,560 impressions, including 73 illustrations comprising 248,061 copies and 1,238,425 impressions for the Government Printing Office. The rest of the miscellaneous printing and service was done for 31 units of the Government, including branches of the Survey and various States. Two well-known items produced were the United States Water Resources Development Map and the Bureau of Land Management Map of the United States. Also, 1,843 type jobs (impressions on cellophane for map preparation) were delivered, and 1,484 maps were mounted on cloth.

The total cost of all production was \$1,327,560.11. Of this amount \$28,417.54 was received from other agencies for map sales and \$50,324.65 was paid by other agencies for printing or service work. The remainder of the cost, \$1,248,817.92, was charged directly or indirectly to Survey funds.

A summary of the work accomplished within the Survey's plant is as follows:

1. A total of 6,086,424 map copies (31,784,754 impressions) was reproduced and delivered.
2. The Photographic Process Section prepared 10,528 photolithographic printing plates, and the Hand Transfer Section prepared 1,241 printing plates.
3. The Photographic Laboratory made 13,262 photolithographic negatives; 2,767 photographic negatives ranging from 2 by 2½ inches to 30 by 40 inches; 19,487 prints ranging from 1½ by 2 inches to 40 by 72 inches; developed 65 film packs and 75 rolls of film; made 983 lantern slides; developed and printed 56,665 feet of 35 mm. aerial film; and mounted 651 prints.

### Distribution

The Distribution Branch distributes Geological Survey publications through Washington, Denver, and Alaskan units, and distribution operations are also handled by 11 other Survey field offices. Further distribution is carried out by approximately 400 commercial agents who purchase maps for resale to the general public.

Publications received during the year include 269 reports in book and pamphlet form, printed by the Government Printing Office and the Interior Duplicating Section, and 2,221 map publications, listed in the report of the Map Reproduction Branch, or a total of 2,490 publications received.

Total receipts from the sale of maps and folios amounted to \$258,776.71, of which \$28,417.54 was received from other Federal agencies. The orders involved the receipt and processing of 130,000 individual requests. The number of copies distributed by Geological Survey offices was as follows:

	Maps, folios and indexes
Washington.....	1, 516, 998
Denver .....	754, 821
Alaska .....	43, 134
Other Field Offices.....	93, 369
Total.....	2, 408, 322

The following tabulation shows the volume and type of publications received and distributed during the fiscal year. The table also shows the quantity of these materials on hand at the beginning and close of the period.

	On hand July 1, 1953	Received	Distributed	On hand June 30, 1954
Geologic folios.....	11, 005	-----	1, 025	9, 980
Maps and indexes.....	24, 174, 925	5, 740, 852	2, 407, 297	27, 508, 480
Books and pamphlets.....	728, 640	168, 973	203, 267	694, 346
Total.....	24, 914, 570	5, 909, 825	2, 611, 589	28, 212, 806

### FUNDS

During the fiscal year 1954, obligations were incurred under the direction of the Geological Survey totaling \$48,485,757. Of this amount 56 percent was appropriated directly to the Geological Survey, 32 percent was made available by other Federal agencies, and 12 percent by States and their political subdivisions.



*Obligations incurred by the Geological Survey in fiscal year 1954, by source of funds*

## Topographic surveys and mapping :

Geological Survey appropriation.....	\$11, 572, 715
States, counties, and municipalities :	
Reimbursements .....	1, 613, 967
Direct State payments.....	42, 800
Bureau of Reclamation.....	1, 166, 487
Department of the Air Force.....	868, 482
Department of the Army.....	259, 495
Department of the Navy.....	9, 596
Atomic Energy Commission.....	198, 809
Foreign Operations Administration.....	43, 762
Government Printing Office—map reproduction.....	40, 796
Miscellaneous Federal agencies :	
Sale of maps.....	28, 418
Aerial photographs and photographic copies of records.....	30, 539
Other.....	50, 270
Sale to the public of aerial photographs and photographic copies of records.....	66, 233
Sale of personal property.....	35, 325
<b>Total.....</b>	<b>16, 027, 694</b>

## Geologic and mineral resource surveys and mapping :

Geological Survey appropriation.....	6, 339, 638
States, counties, and municipalities: reimbursements.....	141, 919
Bureau of Indian Affairs.....	20, 767
Bureau of Mines.....	2, 256
Bureau of Reclamation.....	194, 495
Defense Minerals Exploration Administration.....	344, 187
Department of the Air Force.....	23, 823
Department of the Army.....	1, 067, 560
Department of the Navy.....	409, 163
Atomic Energy Commission.....	7, 191, 812
Foreign Operations Administration.....	451, 248
General Services Administration.....	72, 921
Government Printing Office—map reproduction.....	101, 095

## Miscellaneous Federal agencies :

Security classified.....	98, 163
Other.....	356
Sale of personal property.....	7, 014

<b>Total.....</b>	<b>16, 466, 417</b>
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## Water resources investigations :

Geological Survey appropriation.....	6, 731, 953
States, counties and municipalities :	
Reimbursements.....	2, 843, 403
Direct State payments.....	980, 063
Bonneville Power Administration.....	5, 398
Bureau of Indian Affairs.....	113, 213
Bureau of Reclamation.....	807, 323

*Obligations incurred by the Geological survey in fiscal year 1954, by source of funds—Continued*

## Water resources investigations—Continued

Fish and Wildlife Service.....	\$6, 625
Office of Territories.....	14, 317
Department of Agriculture.....	104, 649
Department of the Air Force.....	49, 630
Department of the Army.....	1, 070, 260
Department of the Navy.....	52, 560
Department of State.....	92, 568
Atomic Energy Commission.....	260, 568
Tennessee Valley Authority.....	91, 021
Foreign Operations Administration.....	229, 142
Miscellaneous Federal agencies.....	16, 543
Permittees and licensees of the Federal Power Commission.....	78, 669
Sale of personal property.....	18, 251

Total.....	13, 566, 156
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Soil and moisture conservation: Geological Survey appropriation.....	98, 520
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## Classification of lands:

Geological Survey appropriation.....	409, 996
Miscellaneous Federal agencies.....	53
Sale of personal property.....	678

Total.....	410, 727
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## Supervision of mining and oil and gas leases:

Geological Survey appropriation.....	1, 194, 994
Department of the Navy.....	33, 398
Miscellaneous Federal agencies.....	646
Sale of personal property.....	36

Total.....	1, 229, 074
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## Development of water wells on public lands: Payments from proceeds of sale of water.....

General Administration: Geological Survey appropriation <sup>1</sup> .....	850
	686, 319

## Summary:

Geological Survey appropriation.....	27, 034, 135
States, counties and municipalities:	
Reimbursements.....	4, 599, 289
Direct State payments.....	1, 022, 863
Other Federal agencies.....	15, 622, 414
Permittees and licensees of the Federal Power Commission.....	78, 669
Sale to the public of aerial photographs and photographic copies of records.....	66, 233
Sale of personal property.....	61, 304
Payments from proceeds, sale of water.....	850
Grand total.....	48, 485, 757

<sup>1</sup>In addition, funds advanced or reimbursed by other Federal agencies for program expenses bear an equitable share of general administrative expenses. Such charges in 1954 were \$444,210.

# Bureau of Mines

John J. Forbes, *Director*



## FOREWORD

THE Bureau of Mines, during the past year, continued to perform essential services for a nation becoming increasingly aware of its position as a leading producer of minerals and as a world power deficient in many of the materials necessary for future security.

Stimulated by a growing population and a rising standard of living, the American appetite for minerals has become so great that more than 15 tons of mined products is needed yearly for every man, woman, and child; and many of the high-grade deposits formerly used to satisfy our millions have been seriously depleted by 3 costly wars in less than 4 decades.

Past experience has shown, however, that as we exhausted our rich ores, we usually found ways to use materials of lower grade. We now obtain magnesium from sea water and are approaching commercial recovery of manganese from open-hearth steel-furnace slags. We have learned to burn coal more efficiently. We have also found ways to extract, from relatively abundant sources, such new metals as titanium and zirconium to meet the requirements for unique materials with unusual properties in the defense and nuclear-energy programs and in industry.

By developing more efficient means of recovering and utilizing minerals and mineral fuels, by finding new uses for plentiful materials and substitutes for scarce ones, and by promoting health and safety among workers in the extractive and processing industries, the Bureau of Mines helps to overcome the Nation's mineral-resources problems. It also collects, analyzes, and publishes statistical and economic data on foreign and domestic minerals for use by industry and by Government in planning research and defense programs.

Important advances continued to be made last year in research on fuels and explosives.

The Bureau tested equipment and studied methods for increasing safety and improving production and recovery in both bituminous-



coal and anthracite mines and published several estimates of coking-coal reserves. A kerosine-flotation process for cleaning fine coal was substantially improved, and a method was devised for obtaining lightweight concrete aggregates from coal-washery wastes. Six commercial driers went into operation during the year, using a Bureau-developed process to supply dried lignite for pulverized-coal power boilers. Substantial savings resulted from advice given Federal agencies on installing, testing, and operating fuel-burning equipment.

New knowledge was gained during the year on the action of clays at petroleum-production operations, and a study was completed on the properties and behavior of reservoir rocks in Wyoming. The Bureau published 16 reports telling of its research on primary and secondary oil-recovery operations and, at the end of the year, was preparing similar reports on selected fields in 8 States. Research in petroleum chemistry and refining progressed with identification of 40 organic-sulfur compounds from a Texas crude oil, and completion of 1 part of the cooperative study of the stability and compatibility in storage of diesel fuels and diesel-fuel blends. For the second straight year the Bureau produced a record volume of helium.

Laboratory and pilot-plant studies on producing synthetic liquid fuels from coal resulted in development of improved catalysts to speed reactions for both the gas-synthesis and the coal-hydrogenation processes, and methods developed by the Bureau for gasifying coal at atmospheric pressure were applied commercially by industry during the year. Entrained-solids retorting of oil-shale fines produced good yields of high-quality oils that are potential sources of gasoline and chemical raw materials, while other experiments showed that high-octane gasoline usually can be produced by hydrogenation from light gas oils retorted at high temperatures. At Rifle, Colo., gas-combustion retorting tests produced more than 1,000 barrels of oil from 2,240 tons of raw shale, and operation of chemical and thermal refining units was concluded.

The Bureau made 1,921 tests of permissible and special explosives and hazardous chemicals during the year and investigated explosion hazards of 80 different mineral and industrial dusts for the Armed Forces and industry. Schedules for testing explosives, blasting devices, and stemming devices for confining explosives were prepared. Other researchers devised a new method of measuring detonation temperatures.

Research on metallic and nonmetallic minerals progressed steadily. The Bureau continued to seek domestic sources of manganese, examining many mineral properties and conducting drilling investigations at two large low-grade deposits. Besides performing experiments indicating that pig irons of any desired manganese content can be

made from low-grade materials, Bureau metallurgists extracted manganese from low-grade ores of Maine. Other ferrous-metals research included experimental smelting of taconite, studies to improve steel-making techniques, and completion of a drilling project which indicated nearly half a million tons of strategic nickel in the vicinity of a Government-owned plant in Cuba.

The Bureau cooperated with industry to increase recovery from large copper deposits in Michigan and Arizona and worked with the Geological Survey to find ways of reducing costs on zinc-lead exploratory projects.

Drilling conducted for the Atomic Energy Commission indicated commercial quantities of uranium and thorium minerals in several deposits. Special techniques were devised for analyzing radioactive ore samples; progress was made in the development of new methods of producing tantalum-columbium, uranium, and rare-earth metals; and more than 11,000 samples of ore believed to contain fissionable elements were analyzed and evaluated for the AEC. During the year the Bureau developed techniques for recovering beryl from ores in South Dakota and North Carolina, sought ways of obtaining critically short selenium from large low-grade deposits, and remained the principal source of ductile zirconium and hafnium needed for atomic-energy uses.

The Bureau shut down its alumina plant at Laramie, Wyo., in March 1954, after producing about 800 tons of alumina from anorthosite rock and assembling valuable technical and cost data. Successful studies were completed on producing and refining aluminum-silicon alloys from clay and on improving structural properties of magnesium-lithium-aluminum alloys. At its pilot plant in Boulder City, Nev., the Bureau produced 389,256 pounds of titanium metal for the General Services Administration of the Federal Government.

Research was intensified on synthetic mica and block talc, and progress was made in the effort to increase supplies of asbestos, fluorspar, sulfur, and industrial diamonds. The Bureau established testing units underground to increase mining efficiency and continued to participate actively in the Department's river-basin development program for greater utilization of resources.

Continuing its program of promoting health and safety in the mineral industries, the Bureau carried on a vigorous campaign of research, investigation, training, and inspection of individual coal mines.

Although the 1953 coal-mine fatality rate of 0.84 per million man-hours was an alltime low, both the bituminous-coal and anthracite industries suffered serious economic setbacks. To help reduce the rising accident and fatality rates that usually accompany such con-

ditions, the Bureau placed increased emphasis on safety training. Nearly 17,000 workers completed the Bureau's 20-hour accident-prevention course for coal miners during the year, and more than 1,000 supervisors and aspirants for supervisory positions completed a similar course requiring 40 hours of attendance. Bureau personnel were specially trained to expand the activities of the Holmes Safety Association, a means of achieving closer coordination and cooperation with industry in promoting health and safety work.

Thousands of samples of mine atmosphere, gas, and dust were analyzed; electrical and diesel equipment was tested for safe use underground; and research was performed and advice given to operators on mine-ventilation and roof-bolting problems. Work continued on flood prevention in the Pennsylvania anthracite region and control of fires in inactive coal deposits.

Under the Federal Coal-Mine Safety Act Bureau personnel made more than 4,000 regular inspections and more than 3,000 special inspections of mines subject to the act's mandatory provisions.

## FUELS AND EXPLOSIVES RESEARCH

During the year Bureau tests in anthracite mines equipped with yielding steel props and a high-speed conveyor-operated backfilling device showed that coal removal and backfilling could be accomplished without breaks of roof or surface subsidence. An imported pneumatic backfilling machine also was operated and was found capable of pumping fill material satisfactorily for distances up to about 1,100 feet.

Studies of three imported German coal planers operating in bituminous coal of varying friability, height, and ease of mining indicated that in friable coal that breaks easily from the roof, higher production and better recovery can be achieved with the planers than with conventional mechanized mining. Bureau engineers observing operations with continuous coal-mining machines in 6 States found that average production per man-shift ranged from 13.5 to 70.6 tons with the machines, compared with 9.1 to 39.8 tons with conventional methods.

Estimates of known recoverable reserves of coking coal were published for 5 counties—2 each in Pennsylvania and Kentucky and 1 in Tennessee. Reports for 7 other counties were drafted and investigations continued in Tennessee and West Virginia.

*Coal preparation.*—Besides finding a way to increase capacity and at the same time reduce power requirements in a kerosine-flotation process for cleaning fine bituminous coal, the Bureau published a report summarizing studies of launder screens used in cleaning and recovering fine sizes of anthracite.



A report was published on the cleaning characteristics of coking coals in Knott County, Ky., reports on other counties were being prepared, and field and laboratory work progressed.

*Drying, combustion, coking, and gasification studies.*—Six commercial driers began operating at Rockdale, Tex., during the year, using the Bureau's fluidized-bed process to supply dried lignite to pulverized-coal-burning boilers. They performed satisfactorily at design capacities of 50 tons per hour each and at rates down to half this capacity. The first prototype carbonizer was completed and gave excellent results in early tests, producing substantial quantities of tar and light oil, which will be tested for properties and uses.

Pilot-scale fluidized-bed driers and carbonizers developed at Denver were used during the year to make chars and liquid products from several western subbituminous coals and lignites, three Philippine coals, and a Brazilian oil shale.

After testing two coal-gasification methods, the Bureau rejected one as unpromising; it determined critical operating factors for the other and also for a method of re-forming gases to make high-B. t. u. gas. A new method was devised for burning coal-washery wastes to obtain lightweight aggregates for use in concrete mixtures, and a report was published on combustion and gasification of lignite.

Important similarities in the behavior of coking coal in test ovens and in full-scale slot ovens were found through pilot-scale experiments. The Bureau of Mines-American Gas Association test was used to determine yield and quality of various products from 42 American coals and 4 coals from Colombia, South America. Selectively distilled coal-tar pitches were coked in laboratory studies of the basic mechanism of carbonization.

*Coal constitution and analysis.*—To help develop an international system for classifying low-rank coals, the Bureau cooperated with the Economic Committee for Europe by analyzing samples of lignites and brown coals from Europe and the United States. It also continued to analyze samples of coal, coke, coal dust, rock dust, slags, and other materials in connection with Government coal purchases, Federal coal-mine inspections, and Bureau research. Small-scale assays indicated potential yields of coke (or char) and coal chemicals from low-temperature carbonization.

*Services to the Government.*—The Bureau continued its advisory services to Federal agencies on installing, testing, and operating fuel-burning equipment continued during the year and demonstrated the effectiveness of certain ammonia compounds and amines in reducing corrosion in return boiler-water lines. Boiler-water samples were examined for Federal agencies, and feed-water testing kits and special chemicals for testing were distributed to agencies needing them to

combat costly corrosion in heating equipment. Savings to the Federal Government during the fiscal year from these activities alone are conservatively estimated to be at least equal to the appropriations for the entire Bureau of Mines.

Assistance to State and municipal governments on air- and stream-pollution problems continued, frequently resulting in recovery of valuable products that more than paid the cost of reducing or eliminating pollution.

*Coal economics.*—Despite heavily increased demands for energy, production of both bituminous coal and anthracite declined steadily during the year, principally because of the shift to oil and natural gas. Serious economic and social problems arose as bituminous-coal output dropped to the level of prewar depression years and anthracite production reached its lowest point since the turn of the century.

The Bureau's statistical and economic research on solid fuels continued to provide clear analyses of factors underlying changes in production, consumption, stocks, and imports and exports of coal and competing energy sources. Complex information was assembled and interpreted for forecasting military and civilian fuel requirements.

Aiding mobilization planning, the Bureau estimated future solid-fuels-industry requirements for steel and other materials and reviewed data on coking-coal production capacity. It also gave other Federal agencies information on coal, coke, coal chemicals, and foreign coal operations and data to various Members and committees of Congress.

## PETROLEUM AND NATURAL GAS

*Petroleum and natural-gas production.*—Clay studies, coordinated between Bureau laboratories in California, Wyoming, Oklahoma, and Pennsylvania, progressed during the year. Much was learned about the function of clays, under various conditions, in oil-well drilling fluids, in completing oil and gas wells, and in petroleum reservoirs where they inhibit oil flow by swelling on contact with encroaching or injected water. Nearing completion is a report on physical properties and behavior of reservoir rocks in an area of Wyoming where such information will be useful in secondary-recovery operations.

Rapid advances in laboratory work during the year led to arrangements for a cooperative field test on use of detergents to increase the efficiency of water flooding of oil fields. Sixteen reports were published, presenting results of research on primary- and secondary-recovery operations. Similar reports are being prepared on selected petroleum fields in Arkansas, California, Kansas, Louisiana, Oklahoma, Pennsylvania, Texas, and West Virginia.

The Bureau's small-diameter well-bore caliper has attracted the attention of the petroleum industry and the Geological Survey; the latter can use it for surveying diamond-drill holes at uranium prospects.

The Bureau closed its laboratories at Bradford and Franklin, Pa., during the year and transferred its staff and equipment to the new Morgantown (W. Va.) Experiment Station.

*Petroleum chemistry and refining; thermodynamics.*—Studying sulfur in petroleum in cooperation with the American Petroleum Institute, the Bureau identified 40 organic sulfur compounds in fractions from a Texas crude oil, proved the presence of elemental sulfur in many crude oils, and showed that more than 85 percent of sulfur compounds in the higher boiling fractions of oil are of the thiophene type. The 38th in a series of standard samples of high-purity organic sulfur compounds was prepared to aid other researchers.

Accomplishments in thermodynamics research included development of an accurate pressure-volume-temperature apparatus and completion of the following: Low-temperature studies on 15 pure compounds; vapor-heat capacity and heat-of-vaporization measurements for 8 compounds and heat-of-combustion determinations for 13 others; vapor-pressure studies for 5 substances; thermodynamic-property studies on 6 pure materials; a new equation of state for gases; and a new correlation for thermodynamic properties of elemental sulfur.

Also completed during the year was a cooperative study to determine why certain diesel fuels and diesel-fuel blends deteriorate in storage. Besides showing that oxygen must be present for gum formation, the Bureau determined some of the effects of nitrogen, sulfur, polar materials, and metallic constituents in the fuels.

In cooperation with the American Petroleum Institute the Bureau published surveys of motor gasolines and aviation and diesel fuels and considered the feasibility of a survey of burner-fuel oils. Advances were made in a study of the autoignition characteristics of diesel fuels.

Analyses of 165 new crude oils were completed, and reports were published on those in Oklahoma, the Spraberry, Tex., area, and the Big Horn and Williston Basins of Wyoming, Montana, and North Dakota. Reports on Colorado and California will be issued soon.

*Petroleum and natural-gas economics.*—Partly because of efforts to increase capacity for producing, transporting, and refining petroleum to provide for emergencies, total stocks of crude oil and products at the end of 1953 were 8 percent higher than a year earlier. Although industry's operations reached new records, crude-oil production and domestic demand were up only 3.4 and 2.8 percent, respectively.



Total proved reserves of crude petroleum increased during the year to an alltime high of 28,945 million barrels, or about 1.4 barrels for each 1 produced. More than 48,000 new wells were completed, a new record.

Marketed production of natural gas during 1953 was 8,425 billion cubic feet—5 percent greater than in 1952—and new reserves developed were almost 2½ times the volume of production.

*Helium.*—Operating all 4 of its helium plants, the Bureau produced a record 170 million cubic feet of the light, nonflammable gas for Federal agencies and private users. The increase of 20 million cubic feet over that produced in fiscal 1953 was due to greater demands from Federal agencies for defense purposes.

Furthering its search for new sources of helium, the Bureau analyzed samples of natural gas from newly opened fields and made engineering studies of several areas to determine whether they could supply a new helium plant. Other research concerned increasing efficiency of helium production, distribution, utilization, and conservation, with special emphasis on improving the output of present production units.

### *Synthetic Liquid Fuels*

During fiscal 1954 the Bureau concentrated on laboratory and pilot-plant studies to develop basic information industry will need in producing high-quality liquid fuels from coal and oil shale. Coal-to-oil demonstration plants at Louisiana, Mo., were turned over to the Army for disposal, and facilities at the Gorgas, Ala., project for gasifying coal underground remained in standby condition throughout the year. At year's end funds were authorized for reactivating the Gorgas project to test a "Hydrafrac" process that opens a coal seam for gasification.

*Oil from coal.*—More durable catalysts for the gas-synthesis process and more active ones for the coal-hydrogenation process were developed at the Bureau's Bruceton, Pa., laboratories.

Steam consumption was reduced by using a hot, concentrated potassium carbonate solution instead of conventional ethanolamine solutions to remove carbon dioxide from fresh and recycled synthesis gas under pressure. High yields of aromatic gasoline were obtained with relatively low hydrogen consumption in several small-scale runs with the one-stage hydrogenation process.

In a study of the chemical behavior of metal carbonyls, complexes of a cobalt carbonyl with various acetylene derivatives were prepared, which seemed similar to the unstable complexes formed on the surface of gas-synthesis catalysts. Investigation of the coal-hydrogenation mechanism continued with coalification of pure chemical compounds

during heating and reaction with acids, mild oxidation and subsequent pyrolysis of natural coal, and X-ray and spectrometric analyses of natural and artificial coals and coal residues.

Methods for gasifying coal at atmospheric pressure, developed by the Bureau at Morgantown, W. Va., were adopted on a commercial scale by industry during the year, and the Bureau reduced this phase of its gasification program after more than 50 tests on 4 American coals. Important progress was made at Morgantown in developing a pressure gasifier which promises to reduce costs in operations requiring compressed synthesis gas. Efforts to improve purification methods resulted in an analytical procedure for determining carbonyl sulfide in the presence of carbon disulfide, ethyl mercaptan, and thiophene. Activated carbon proved effective in removing hydrogen sulfide from synthesis gas, and water scrubbing in a packed column reduced dust concentration in gas.

*Oil from oil shale.*—Studies advanced during the year on the properties and composition of oil shale and shale oil and the principles involved in processing them.

Good yields of high-quality oils were obtained from oil-shale fines in the Bureau's entrained-solids retort at Laramie, Wyo., which can be operated at various temperatures, producing oils with a wider range of qualities than those made in countercurrent retorts. Because they are far more aromatic, oils retorted at high temperatures are possible sources of premium-quality gasoline and aromatic chemical raw materials.

In cooperation with the Atomic Energy Commission, oil shale from Tennessee was processed in the entrained-solids pilot retort, and the products were analyzed. The pilot retort also was used to determine yields and quality of oils from Brazilian shale, which is difficult to process because of its high moisture content.

Work to determine the constitution and chemical structure of kero-gen—the organic material of oil shale—was intensified, and additional assays were made to provide data on oil-shale reserves. Experiments with light gas oils produced at high retorting temperatures showed that these oils generally can be hydrogenated to yield high-octane gasoline.

In the first 5 runs in a 150-ton-a-day gas-combustion retort at Rifle, Colo., 2,240 tons of raw shale was processed to produce 1,075 barrels of oil. Some problems encountered in the large unit may be solved in the 6-ton-a-day pilot plant, which was used during the year to study process variables. An intermediate 25-ton-a-day unit was nearly complete at the end of the year. Gas-combustion retorting tests were made on shales from Chattanooga, Tenn., and Brazil to supplement entrained-solids tests conducted at Laramie.

Operation of the thermal and chemical refining units at Rifle ended with processing shale oil from the gas-combustion retorts to compare its refining characteristics with those of "N-T-U" crude from previous retorts. An extended run of the thermal unit provided operating facts that will be useful in a commercial plant.

Nearly 58,000 feet of oil-shale samples was collected during the year in Colorado, Utah, and Wyoming. Safety was increased in the experimental oil-shale mine at Rifle by installing a new ventilating fan and more than 4,000 roof bolts. Mining research further proved the effectiveness of rotary drilling, developed more durable drill bits that made it possible to drill at higher speeds, and indicated that as little as one-half pound of explosives is needed per ton of shale blasted.

### *Explosives and Explosions Research and Testing*

*Explosives research.*—The Bureau made 1,921 tests of permissible and special explosives and hazardous chemicals during the year; 176 explosives were on the active permissible list at the end of the year. The quantity of permissible explosives used in coal mines dropped about 9 percent below the previous year, corresponding to an 8-percent drop in coal production. The ratio of permissibles to black blasting powder was 18 to 1—a new high.

Standards for testing explosives, blasting devices, and stemming devices were prepared, and chemochol—a blasting device based on a new principle—was tested and approved for use in coal mines.

Preliminary experiments showed that oxygen content of explosives is a good criterion of permissibility. A new method was developed for measuring detonation temperatures in terms of the light emitted by exploding solid charges, and heavy nitrogen atoms were used to study decomposition of the cellulose nitrate molecule. Application of chromatographic techniques to explosives analysis was resumed.

*Gas- and dust-explosion research.*—Explosion hazards of 80 mineral and industrial dusts were investigated during the year, and a study was made to determine conditions under which coal cuttings can be stored safely underground. Water sprays and hinged troughs filled with water or limestone dust proved effective in arresting flame propagation in ducts and preventing secondary explosions.

Investigation of explosive properties of flammable gases, vapors, and sprays continued, with emphasis on aircraft fuels under conditions of high-altitude flight. High-speed photography was used successfully to observe detonation processes in carbon monoxide-oxygen and hydrogen-oxygen mixtures.

Advances were made in developing and applying techniques for quantitative study of laminar and turbulent flames. Kinetic studies of the oxidation and decomposition of the relatively simple formalde-



hyde molecule added another link in the theory of combustion, and microscopic observation of the slow combustion of carbon at atomic levels progressed. Research was continued for the gas industries on burner design and efficient gas-fuel utilization.

## MINERAL DEVELOPMENT

The need for raw materials for military purposes and demands for many mineral commodities, already receding, dropped even more sharply following the Korean armistice. However, unrest continued elsewhere and made a continued defense buildup imperative; requirements for many strategic metals and minerals thus remained high. Without relaxing its program to develop readily accessible sources of materials essential to defense, the Bureau of Mines began, where possible, to devote attention to long-range technologic and scientific problems of those industries in which demand is leveling off.

Advice on the conduct of the Bureau's mineral-development program was obtained from the chief mining engineer and the chief metallurgist.

During 1954 the Bureau's mining research was appraised and new investigations were recommended, two of which are already under way in cooperation with industry. The Brazilian Government received advice on oil-shale mining problems, research and mining methods and costs were discussed with representatives of foreign technical missions, and consultant service was extended to the Corps of Engineers on an excavation project near Camp Ritchie, Md.

The Atomic Energy Commission's drilling and exploratory practices on the Colorado Plateau were appraised, and a project was conducted for AEC to determine minable reserves of uranium ore in the Chattanooga shales of Tennessee. For the General Services Administration a Canadian copper mine being developed under a loan from the Export-Import Bank was examined, and supervised exploratory work was undertaken by the Bureau to determine reserves of nickel ore at Nicaro, Oriente, Cuba.

Through frequent meetings with members of other Federal agencies and representatives of industry and friendly foreign governments, the Bureau keeps constantly informed on new developments in metallurgy. Information on metals and minerals is maintained, and, by regular correspondence and periodic visits to Bureau experiment stations, these findings are relayed to metallurgists in the field.

The Bureau is represented on many industrial and governmental committees and boards, including the Materials Advisory Board of the National Academy of Sciences. The chief metallurgist, as a member of this board, helped to prepare reports on industrial-diamond conservation, salvage of high-alloy scrap, materials needed for gas tur-

bines for the Nike guided missile and for high-temperature alloys, new magnesium alloys, recovery of cobalt from copper ores of Turkey, recovery of nickel, cobalt and chromium from lateritic ores, and the status of titanium production processes.

Visiting Manila for the Foreign Operations Administration, the chief metallurgist gave advice on the type of metallurgical industry that should be organized to create employment and stabilize the Philippine economy. He also made an on-the-spot study of cobalt losses in Northern Rhodesia and Belgian Congo, investigated an electrolytic titanium process in which the Air Force is interested, and began an intensive study of new processes particularly applicable to hydrometallurgy of complex ores.

*Ferrous metals and alloys.*—The Bureau continued its aggressive search for domestic sources of manganese during the year, examining many areas in various parts of the Nation. Drilling investigations were made to ascertain the extent and character of manganiferous reserves of the Cuyuna range in Minnesota and manganiferous breccia of northeastern Tennessee.

Metallurgical research on manganese progressed with further electric smelting tests on rhodonite and other highly siliceous materials of the Pacific Northwest. Experiments indicated that pig irons of any desired manganese content can be made from low-grade materials. Various metallurgical processes were applied to ores from the Cuyuna range and from Artillery Peak, Ariz., and the Bureau achieved satisfactory extraction of manganese from several Maine ores.

As part of its responsibility for developing more economical and efficient ways of using low-grade domestic iron ores, the Bureau conducted taconite smelting tests in its experimental blast furnace at Pittsburgh, Pa. Seeking improved techniques for making steel, it also studied the addition of materials to an open-hearth furnace by lance injection and investigated effects of various elements on the hot-working characteristics of steel. The Bureau's research laboratory near Redding, Calif., was closed during the year, and its functions were transferred to Pittsburgh. This consolidation will reduce costs and make possible more rapid progress in iron and steel research.

Low-carbon chrome silicide made by the Bureau from offgrade domestic chrome ores was tested by private firms during the year and found satisfactory for use in steelmaking. In cooperation with industry, the Bureau devised a method for producing low-carbon ferrochromium free of contaminants. Also, it produced high-purity chromium metal directly from a refined chromium-chemical electrolyte rather than from electrolytic metal by hydrogen reduction.

Efforts to achieve partial self-sufficiency in strategic nickel paid off during the year with completion by the Bureau of an extensive drilling investigations in deposits of lateritic ore in the vicinity of Nicaro,

Cuba. The project, conducted under an agreement with the General Services Administration, indicated more than 34 million tons of ore averaging 1.39 percent nickel, 0.10 percent cobalt, and 35.8 percent iron. As a result, it was decided to expand by 75 percent the capacity of a Government-owned nickel-processing plant at Nicaro. Bureau metallurgists now are trying to develop methods of recovering the cobalt and iron lost in extracting the nickel. Success would make the Nicaro deposit one of the world's major iron-ore sources.

Other developments in the Bureau's nickel research included continuous direct-smelting tests on low-grade nickeliferous ore from the Red Flats deposit near Gold Beach, Curry County, Oreg., and publication of results of continuous selective reduction tests on ores from Brazil, Riddle, Oreg., and Cle Elum, Wash.

*Base metals.*—To conserve copper resources, the Bureau cooperated with industry in seeking mining methods that will increase ore recovery from the White Pine deposit in Ontonagon County, Mich., one of the world's largest copper reserves. Also in cooperation with industry, it began a study of the mechanics of undercut block caving in the large, low-grade copper deposit at San Manuel, Ariz.

Research on lead and zinc was emphasized. Extensive field tests, made in cooperation with the Geological Survey in the northwestern part of the Tri-State district, showed that costs may be reduced by substituting geophysical methods for churn drilling in the preliminary stages of some zinc-lead exploration projects. The Bureau continued to maintain the Leadville drainage tunnel, which saw little use during the year because of depressed conditions in the lead- and zinc-mining industries.

Research to improve zinc die-casting alloys so they can compete more effectively with other materials showed that maximum strength is obtained with 2 to 5 percent manganese; ductility is best at the lower end of this range. Further studies will deal with effects of lithium, copper, aluminum, and beryllium.

Research on recovering cadmium and germanium as byproducts of zinc smelting resulted in high extraction of the combined metals by fuming from zinc concentrates. However, separation of the metals requires further study.

Encouraging developments in long-term investigations of methods for recovering nonferrous metals from scrap included successful molten-centrifugation tests on zinc containing iron and lead and on intermediate tin-smelter products high in iron, arsenic, and antimony. High-purity zinc was recovered experimentally from galvanizer's dross by electrolysis.

*Rare and precious metals.*—In its search for deposits of fissionable elements for the Atomic Energy Commission the Bureau drilled and sampled more than 30 prospects and examined more than 100 others



for possible future investigation. Commercial quantities of uranium and thorium minerals were indicated in several deposits.

Metallurgical research directly related to the exploratory program developed special techniques for analyzing radioactive ore samples. Encouraging progress also was made in studies to develop new methods for producing tantalum-columbium, uranium, and rare-earth metals in relatively pure form.

Under a contract with the AEC, the Bureau analyzed and evaluated more than 11,000 samples of ore believed to contain fissionable elements.

Increased domestic production of strategic beryllium is promised by the Bureau's development of methods for recovering beryl from ores mined in South Dakota's Black Hills and at King's Mountain, N. C. Columbium and tantalum, both of which have important defense applications, were recovered experimentally from tin slags and titanium and bauxite ores.

Using Bureau-developed processes, industry began producing zirconium and hafnium during the year. Initial output was small, however, and the Bureau's Northwest Electrodevelopment Laboratory at Albany, Oreg., remained the principal source of these metals required by the Atomic Energy Commission.

A critical shortage of selenium, used extensively in the electronic, chemical, and metallurgical industries, spurred the Bureau's search for means of recovering the element from large, low-grade deposits.

*Light metals.*—Demonstration-scale operation of the Laramie, Wyo., alumina plant was terminated in March 1954, ending one phase of an extended program aimed at recovering alumina from domestic materials other than bauxite. In 15 operational runs the Bureau produced about 800 tons of alumina from anorthosite rock and obtained technical and cost data that will serve as a basis for estimating the value of other materials as potential sources of alumina. Although costs were such that the product cannot compete with alumina from bauxite at current prices, the technical feasibility of the process was demonstrated and the bulk of the plant's output was sold to industry.

Other valuable operating information was collected during the year as a result of successful tests on producing and refining aluminum-silicon alloys from clay in an electric furnace. In cooperation with the Geological Survey, the Bureau finished a comprehensive report on the bauxite industry, which the Office of Defense Mobilization is to publish under the title, "Materials Survey—Bauxite."

Fiscal year 1954 saw completion of an important phase of research on developing improved structural properties in magnesium-lithium-aluminum alloys, considered the lightest and most ductile of the magnesium-base alloys. By adding to the store of basic information on

magnesium and improving the technology of its alloys, the Bureau hopes to hasten the time when this versatile metal can take its place as a major structural material.

Under a contract with the General Services Administration's Emergency Procurement Service, the Bureau's pilot plant at Boulder City, Nev., is producing titanium sponge metal to supplement insufficient commercial production. From July 1953 to May 1954 the Bureau made 389,256 pounds of metal under this contract, which will expire in October 1954.

Research on the extractive and physical metallurgy of titanium moved ahead during the year. Besides devising a method for making titanium mixtures that can be treated by electrolysis to produce high-purity metal, the Bureau studied fabricating, alloying, and heat-treating techniques. Other research involved production of titanium tetrachloride from ilmenite and other titaniferous materials; chemical and galvanic corrosion of the metal and its alloys and welds; and methods for electroplating titanium onto other metals.

*Ceramic and fertilizer materials.*—In cooperation with industry, the Bureau completed large-scale pilot-plant tests, producing good-quality synthetic mica that can be used in commercial manufacture of glass-bonded mica products. It also helped to evaluate synthetic mica as a bond for abrasive wheels and conducted research to improve the strength and flexibility of reconstituted mica sheet. A new ceramic dielectric, phosphate-bonded synthetic mica, was developed.

Reconstituted block talc, developed by the Bureau, was tested by industry in vacuum power tubes to determine its behavior as a high-frequency insulator material. Bureau laboratory tests indicated that hot-pressed synthetic mica and phosphate-bonded synthetic mica are promising substitutes for natural block talc.

During the year the Bureau acted as an engineering consultant to the General Services Administration in the experimental operation of a Government-owned graphite mine and mill at Chester Springs, Pa. Results of the operation showed that graphite suitable for manufacturing crucibles can be produced, although at high cost.

A mining machine, patterned after one used in mining coal, was designed by the Bureau to meet conditions in underground mining of phosphate rock. During experimental mining in cooperation with industry, various types of cutting heads and plows, and different lengths of steel and methods of crowding the face were employed in attempts to cut up the dip in a selected stope. Research also continued during the year on beneficiation of low-grade phosphate rock from Idaho, Wyoming, and Utah.

Pilot-plant studies were undertaken to recover kyanite-sillimanite concentrates from mill tailings produced at Florida ilmenite-monzonite operations.

Production, resources, and markets for ceramic materials of the Pacific Northwest were surveyed during the year, and a report is being prepared. Ceramic properties of selected refractory-clay samples from core drilling in Idaho were evaluated.

Field investigations were begun in Colorado to develop sources of refractory clays now in short supply and vital to metallurgical and other industries in the area.

*Construction and chemical materials.*—As supplies of fluorspar from foreign sources increased, the Bureau began to reevaluate this commodity's domestic position, reviewing current and potential supplies and conducting tests to improve methods of recovering fluorspar from some of its more complex ores. Research continued on recovering fluorine from waste gases evolved in phosphate-rock processing and converting it into synthetic cryolite or other commercial fluorine compounds. Several fluorspar prospects and occurrences were examined, and a drilling project in the fluorspar district of Kentucky was completed.

To reduce United States dependence upon imported industrial diamonds, the Bureau conducted research on the preparation and properties of comparable synthetic materials, such as carbides, silicides, borides, and nitrides, to determine their suitability as substitutes.

The Bureau examined several domestic asbestos deposits, most of them in California and Maine, and continued research on beneficiating high-iron chrysotile for nonferrous uses. Progress was made in improving the quality of synthetic asbestiform compounds, and synthetic asbestos fibers made by the Bureau were submitted to industry for testing. A comprehensive report on major phases of the asbestos industry throughout the world was almost completed, and one describing asbestos deposits of Arizona had been compiled.

Field investigations and laboratory testing of mineral construction materials continued to provide information vital to the development and defense of Alaska.

The Bureau continued its comprehensive survey of domestic sulfur resources, examining deposits and preparing reports on several areas.

*Miscellaneous research on minerals.*—In its efforts to apply physical theory to mining problems, the Bureau used equipment developed in its laboratories for microseismic recording and borehole surveying in studying design, control, and behavior of underground mine openings in Michigan, Arizona, Ohio, Missouri, and Colorado. To provide more complete instrumentation, construction was begun on a camera that can be used to photograph the inside of a borehole.

Blasting research indicated that damage produced at a free surface by an explosion in rock can be predicted from only a knowledge of the weight and depth of the charge and a general classification of the rock.



Researchers now are seeking a simple way to predict the volume of rock that will be broken by an explosion in a given rock type. In supplemental studies the Bureau determined physical properties of 19 major rock types and continued to investigate the interrelationship of certain properties.

Encouraging results were obtained during the year in attempts to develop a diamond-drilling technique in which the normal flow of drilling fluid is reserved to increase drilling speed and core recovery. Work continued on a manual for the Corps of Engineers on design of underground installations in rock.

The Bureau continued to measure and correlate thermodynamic properties of metals, nonmetallic minerals, and inorganic chemical compounds, furnishing valuable information to industry and to other research organizations for the formulation and evaluation of chemical and metallurgical processes.

Research on applying ultrasonics—the science of sound waves at frequencies above the limit of human hearing—to mineral-dressing problems revealed that ultrasonic irradiation can reduce twentyfold the mechanical-agitation time required to condition mineral surfaces for flotation.

The Bureau further developed the fluorescent X-ray spectrograph into a routine production tool that provides rapid, easier, and cheaper analyses of many elements on large numbers of samples; provided technical advisory and consulting services for the Department of the Interior's saline-water-conversion program; and began a preliminary study of the possibility of extracting minerals from sea water.

## RIVER-BASIN ACTIVITIES

Cooperation with other Federal and State agencies in the Department's long-range program for wise development and use of all resources in the several river basins of the United States continued during the year. Since the success or failure of a mineral industry often depends upon availability and cost of water and power, the Bureau conducts thorough investigations to make sure that mineral potential is given proper consideration in planning development of water and power resources in these areas.

*Arkansas-White-Red River Basins.*—Surveys of mineral-industry and resource potential continued in the 8-State basin area, involving more than 40 minerals now produced commercially. A long-range program for mineral investigations and research was prepared and approved by the Interagency Committee. Reconnaissance examinations and reports of 140 newly proposed reservoir sites and 35 previously authorized projects were made for construction agencies. Statements

were prepared showing the effect on mineral industries of some 270 proposed dams and reservoirs. Several sites involved cement plants, large producing oil and gas fields, or deposits of coal or other important minerals. To achieve coordination among cooperating agencies, Bureau engineers reviewed 370 reports submitted by others. Four special detailed subbasin mineral-inventory reports were made to the committee, and others are nearly complete.

*Missouri River Basin.*—Nine preliminary reports were prepared and distributed to cooperating agencies during the year. They described mineral resources and mineral industries that may be affected by water-development projects. Included was information on minerals and metals in the fire-clay districts of Missouri, the Black Hills of South Dakota, and the Sun-Teton Division in Montana; manufacture of ammonia and lightweight aggregates in North and South Dakota; mineral production for the basin, 1910–50; and applied physics studies at dam sites. Area studies were begun on minerals and metals in the Powder Division, Montana, and the northern coal district of Missouri; oil and natural gas in the Cheyenne Division, Wyoming, and the Williston Basin, Wyoming and North Dakota. Studies were under way on storing, carbonizing, drying, and pelletizing lignite; minerals- and metals-utilization studies progressed on chromite, cement, phosphate, aluminum, titaniferous magnetite, limestone, gypsum, and lightweight aggregates.

*New England-New York Survey.*—Mineral-industry and resources studies are being continued in the six New England States and New York. Thirty-two mineral-commodity reports were prepared, and 28 river-basin reports were written in cooperation with the Geological Survey. Field investigations were made of deposits of lead and zinc, asbestos, emery, coal, peat, slate, granite, limestone, talc, anorthosite, and pegmatite minerals.

Problems of mineral-industry waste were studied at 597 plants by Bureau engineers who took complete inventories of water-borne mineral wastes at 369 of them. Technical assistance on waste problems was given at 22 plants. A paper, *Regeneration of Spent Pickle Liquor*, was published.

*Other River Basins.*—Investigations related to the use of water and power in developing resources are also under way in several other areas of the United States and in Alaska.

## SAFETY AND HEALTH ACTIVITIES

For more than 44 years the Bureau of Mines has conducted intensive programs of research, investigation, and training to promote safe and healthful working conditions in the mineral industries. In 1941 Bureau personnel were authorized for the first time to inspect indi-

vidual coal mines, and in 1952 they were directed by the Congress to enforce regulations for preventing major disasters in the Nation's larger coal mines. Although it regards these more recently assumed responsibilities as important and necessary, the Bureau does not consider them a cure-all for health and safety problems. It continues to rely heavily on research and investigation to identify hazards and develop ways of eliminating them and on training individual workers and supervisors to spread the knowledge gained throughout the mineral industries.

*Work on primary hazards.*—The Bureau continued its fight against falls of roof and coal and haulage accidents, which together caused nearly 83 percent of all fatalities and 45 percent of all injuries in coal mines during 1953. Conducted in cooperation with State and industrial officials, the campaign against these hazards includes research, investigation, education, and promotion of better roof-control and haulage practices.

The outstanding development in the Bureau's roof-control program has been the adoption of roof bolts as a substitute for wooden timbers. This method has been found so effective and economical that the Bureau has recommended its use wherever feasible, and at the end of the fiscal year 580 coal and 150 noncoal mines were using them.

During 1948, when the Bureau first sponsored roof bolting in coal mines, the roof-fall fatality rate was 0.62 per million man-hours of exposure. This figure was reduced to 0.44 in 1952 but increased again to 0.51 in 1953, when unsettled conditions in the industry made proper maintenance difficult.

Bureau employees in the field held scores of conferences on roof control during the year with mining-company officials and inspectors of State mining departments. They made regular surveys of roof-bolt installations in all districts, submitting reports to operators, State inspectors, and Bureau headquarters in Washington. The Bureau also conducted cooperative tests, in both anthracite and bituminous-coal mines, of various other types of roof supports, including yielding props, steel props, concrete and wooden sets, and extensible canopies.

Progress in the Bureau's program to reduce haulage accidents has been steady. A special section, established in 1950 to study causes of these accidents and ways of preventing them, presents its findings to industry through published reports and motion pictures. Two recent films, photographed underground, were in demand for showing at local and national safety meetings. They depicted hazardous and prescribed practices in shuttle-car operations and in the use of track haulage equipment.

The number of fatal haulage accidents in both bituminous-coal and anthracite mines has been substantially lowered as a result of this campaign. Bureau figures for 1953 show that haulage fatality rates



per million man-hours of exposure were reduced more than 22 per cent from the 1952 total.

*Tests of equipment.*—Inspection and testing of electrically operated mine equipment resulted in approval of 67 complete units of various types as permissible for safe use in coal mines. Cooperating with the Pennsylvania Department of Mines, the Bureau made 42 flame tests on electrical trailing cables offered by manufacturers for use with face equipment. Studies were made to develop portable equipment for sampling exhaust gases from diesel engines, and work was done on several types of conditioners for these engines.

During the year special studies were continued for the Navy on electrical fire and explosion hazards on vessels and in aircraft.

*Health.*—The Bureau continued to study conditions affecting the health of workers in the mineral industries. It supplied information on mine ventilation and determination and control of harmful gases and dusts and tested respiratory protective devices.

More than 15,800 samples of coal-mine air and 500 atmospheric samples from other industrial sources were analyzed during the year. Most of the samples were collected during coal-mine inspections, but more than 100 came from sealed fire areas in coal mines. Several were taken from metal and nonmetallic mineral mines. One new approval and 46 extensions of approval were granted on respiratory protective devices during the year.

Laboratory studies were continued for the Bureau of Ships on the nature and quantity of toxic gases produced by thermal decomposition of plastics. Two reports on this work were completed during the year. Similar studies were prepared under a contract with the Westinghouse Electric Corp., and a report was submitted.

An investigation showed that employees in a coal-cleaning plant were being exposed for brief periods to unsafe concentrations of carbon tetrachloride vapors from float-and-sink testing. After substituting tetrachlorethylene for the carbon tetrachloride, the plant management requested additional Bureau tests, which indicated that harmful exposures were negligible. Other studies concerned irrespirable atmospheres in manholes, gas leakage into basements, flammable vapors from roof coatings, performance of a calorimetric carbon monoxide indicator in the presence of oxides of nitrogen, and use of infrared spectrometry to determine explosive gas in mine-air samples.

Cooperating with the Signal Corps, the Bureau made 158 spectrographic analyses to complete its part of a study of coal and coal ash as sources of rare elements. Chemical, spectrographic, petrographic, and X-ray diffraction examinations were completed on representative samples of perlite to determine possible health hazards in handling and processing it.

Late in the year development of a second experimental coal mine was begun at Bruceton, Pa. This will be used exclusively for dust studies, which cannot be conducted in the existing mine because of conditions created by other experiments in progress there. A survey of dust-control practices in the coal-mining industry was initiated during the year, and literature on the prevention and suppression of dust in mining, tunneling, and quarrying was assembled and summarized for transmittal to the International Labor Office, Geneva, Switzerland.

Work continued on development of apparatus and techniques for testing respirators used in spray painting. Also, tests were made to determine the concentrations of carbon dioxide produced on re-breathing in a full-facepiece-type respiratory inlet covering, which is being considered for use with self-contained breathing apparatus in mine rescue work.

Complete surveys were made of ventilation systems in 2 coal mines and partial surveys were made in 2 others in connection with coal-mine inspection problems. A study was conducted in another coal mine to determine the effect of barometric-pressure changes on explosive-gas emission from caved areas.

A nonlinear electric analog for semiautomatic analysis of mine-ventilation-network problems, received and installed during the year, was tested and studied. This instrument will permit solution of ventilation problems that are almost prohibitively complex when approached by conventional methods.

*Accident analysis.*—With collection of accident statistics progressing smoothly on a regional basis, the Bureau's Washington staff continued to concentrate on assembling statistical material to meet a steadily rising demand for information on injury and employment experience in the mineral industries.

Fatality and overall injury experience at the Nation's coal mines was reported regularly during the year, and accident statistics for metal and nonmetal mines, stone quarries, and metallurgical plants were brought up to date. At the end of the year, bulletins showing the safety record of coal mines in 1950 and 1951 had been completed, the 1952 bulletin was nearly ready, and work on the 1953 publication was well under way. Statistics were compiled and tabulated for inclusion in revised versions of the Bureau's coal- and metal-mine accident-prevention courses.

The 29th National Safety Competition and the 4th National Sand and Gravel Safety Competition were conducted during the year, and cooperation was given on safety contests sponsored by the National Slag Association, National Lime Association, National Sand and

Gravel Association, and National Crushed Stone Association. A record total of 1,110 plants competed in the various contests.

*Safety training.*—Bureau employees carried out an intensive program of safety education and training which, for more than 44 years, has proved effective in reducing the toll in lives and property claimed by accidents in the mineral industries.

During the year nearly 17,000 men completed a 20-hour coal-mine accident-prevention course for miners, making a total of 96,659 trained since the Bureau inaugurated the course in 1947. More than 19,000 supervisors and aspirants for supervisory positions have completed a similar course which requires 40 hours of attendance. An accident-prevention course for metal miners was completed by 372 persons during the year, and 134 workers in the petroleum industry were given safety training by the Bureau. Safety inspections of nearly all major mills, smelters, and refineries in the United States were made to gather material for a new course the Bureau is preparing.

A total of 37,971 employees in the mineral industries were trained in first-aid and mine rescue procedures, bringing the number trained since the Bureau's establishment in 1910 to nearly 2 million. With the training of 527 new instructors, 20,269 persons throughout the Nation now are qualified to teach the Bureau's first-aid course. During the year 115 mines and plants were awarded certificates showing that 100 percent of their employees had been trained in first aid.

Bureau personnel assisted in 38 first-aid and mine rescue contests in 11 States in which 572 teams participated before audiences totaling nearly 53,000. Explosion hazards of mineral substances and flammability of gasoline vapors were demonstrated before groups estimated at more than 66,000 persons. Bureau safety films showing safe operating methods in coal and noncoal mines and on oil-well drilling equipment and first-aid training methods were seen by 33,798 persons at 699 showings.

Representatives from various Bureau field offices received intensive training at Washington headquarters to prepare them for establishing new Holmes Safety Association chapters and councils throughout the Nation's coal-mining areas. Unsettled conditions in the industry increase the need for expanding the activities of the association, which was established in 1926 to foster closer coordination and cooperation in promoting health and safety in the mineral industries.

*Investigative work.*—During the year the Bureau prepared reports on 31 mine explosions, 36 mine fires, and many of the 368 miscellaneous accidents, including roof falls, premature explosions, explosions in buildings, asphyxiations, and other mishaps which resulted in 372 deaths and 217 injuries. Three of these were major disasters—single accidents causing 5 or more fatalities. One at a gilsonite mine killed



8 men and injured 3, one at an open-pit copper mine killed 5, and one at a chemical plant killed 10 and injured 27. Bureau employees investigated all mine fires and explosions to determine primary causes, probable origin, and contributing factors. Reports of these and other accidents were prepared, recommending ways to prevent their recurrence.

Bureau representatives cooperated with State officials in studies of atmospheric conditions at noncoal mines using diesel equipment. At the end of the year assistance had been given at 79 mines in 25 States where diesel trucks, loaders, bulldozers, drill jumbos, or locomotives are used.

*Anthracite flood prevention.*—A study was completed of surface-water infiltration and its relation to pumping loads in the southern field of the Pennsylvania anthracite region. Extensive field tests were made to determine what metals or alloys would best resist the corrosive effect of acid mine water if used as construction materials for large emergency pumping plants. The tests were completed during the year, and results are being analyzed.

A report was prepared, giving detailed estimates for constructing a single section of the proposed Conowingo-to-Scranton drainage tunnel. The section would provide temporary relief for the Lackawanna Basin until the entire project could be completed. Similar reports are being prepared for sections of the proposed tunnel in the Western Middle and Southern fields and in the Wyoming Basin.

Substantial progress was made in collecting information on the outlook for the anthracite industry. This will be included as background material in a report on the Bureau's study of the anthracite mine-water problem.

*Coal-mine inspection.*—During the fiscal year 1954 the Bureau of Mines completed 24 months of operation under the Federal Coal Mine Safety Act, which became law in July 1952. The act consists of title I, the Federal Coal-Mine Inspection Act of 1941 slightly revised, and title II, which contains mandatory provisions designed to prevent major disasters in coal mines regularly employing 15 men or more underground.

During the year, 4,010 regular inspections of title II mines were made, 73 of them jointly by State and Federal inspectors. In addition, 3,018 special inspections were made to determine whether previously cited violations had been corrected. Inspectors observed 8,489 violations under title II, many of which were corrected immediately. They issued 3,297 original notices setting a reasonable time for abating dangers, 882 notices granting time extensions, and 3,301 notices certifying that dangers had been eliminated.

During the year 159 orders requiring withdrawal of men were issued at 93 mines, 51 orders at 39 mines under the act's imminent-danger clause, and 108 orders at 54 mines for failure to abate violations within a reasonable time. In addition, 25 orders were issued, classing as gassy mines that had previously been considered nongassy.

Industry's cooperation with the Bureau under the act is evidenced by the fact that at the end of 24 months of enforcement only 5 applications for annulment of gassy-classification orders had been made to the Director. One request was granted; the others were denied. Two of the Director's denial decisions were appealed to the Federal Coal-Mine Safety Board of Review, which upheld one and reversed the other. One appeal of a gassy-classification order, made directly to the Board, was denied. The Board received two appeals of withdrawal orders. One of these, which could not be appealed to the Director because it was issued under a State-participation plan, was annulled after the Board found that the dangers had been eliminated. The other was revised to permit time for training men to make required tests for explosive gas. At the request of the operator, the Bureau conducted the training, after which the violation was abated and the order was annulled.

At the end of the year the Bureau's coal-mine-inspection force included 254 coal-mine inspectors, 32 engineers, and 8 electrical inspectors, and supporting personnel. This includes additional employees authorized by Congress in 1952, all of whom have completed training and are engaged in inspection work.

Besides carrying out the enforcement duties imposed by title II of the act, the Bureau made 5,311 inspections of title I mines, including 375 strip mines, making recommendations for voluntary correction of observed hazards.

A revised Federal Mine Safety Code for Bituminous-Coal and Lignite Mines of the United States was issued during the year, after consultations with representatives of labor and management in the industry. Safety standards for anthracite mines also were revised and issued as the Federal Mine Safety Code for Anthracite Mines of the United States.

*Control of fires in inactive coal deposits.*—Since 1949 the Bureau has undertaken control of 41 fires in coal deposits not being mined. Twenty-three of these projects are on the public domain in Colorado, New Mexico, and Wyoming, and 18 are on private property in Pennsylvania, West Virginia, and California. So far, more than 200 million tons of bituminous coal and anthracite, estimated to be worth about \$975,000,000 at current market prices, has been saved at a cost to the Government of less than 1 cent a ton.

The Bureau has a record of 130 additional fires in 9 States. On the basis of preliminary examinations, it estimates that if they are

not controlled they eventually will destroy 300 million tons of coal, besides causing extensive damage to surface property and endangering lives. Surveys have been made of the most serious fires preparatory to controlling them as funds permit.

## MINERAL ECONOMICS

The Bureau continued its long-range analysis of economic factors affecting the mineral industries and collected and published statistics on minerals.

A study was begun of conditions which had resulted in reductions in domestic lead and zinc mine output. Among factors investigated were long-term domestic and foreign market trends, imports, domestic and foreign production of primary and secondary metals, and relations of production and consumption to prices and national economic activity. The Bureau evaluated proposed assistance programs, estimating their cost to taxpayers and their potential benefits to various segments of the mining industry. A technique for economic analysis of distressed mining industries, developed during these studies, now is being applied to other critical-minerals problems, including coal and mercury.

Imports were studied, and various proposals for United States Government action relating to international trade in minerals were analyzed and evaluated. Special studies were made of direct and indirect mineral exports of the United States. In addition, the Bureau cooperated with other organizations analyzing foreign trade in minerals, worked with several groups of the Trade Agreements Committee, supplied material to the Commission on Foreign Economic Policy, and prepared analyses for the President's Cabinet Committee on Minerals Policy.

Research on taxation concerned mostly technical items, some of which were mentioned in the Internal Revenue Code of 1954 (H. R. 8300). Treatment of expenditures in various stages of the development of mineral properties, interrelations of percentage depletion and loss carryover, and estimation of the possible impact of various levels of percentage depletion are typical examples of this work. As an outgrowth of assignments for the President's Cabinet Committee on Minerals Policy, the Bureau examined many tax proposals with the Treasury Department and arranged to cooperate with that Department in a review of minerals taxation which had been scheduled in accordance with the President's budget message of 1954.

At the request of the President's Council of Economic Advisors, commodity surveys were made of the relationship of the minerals industries to national economic growth. This study was designed to



review potential bottlenecks in future expansion and to provide a background for formulating policy and making further inquiries.

The Bureau remained active in the Federal interindustry research program on a sharply reduced scale. Reports were completed on mobilization requirements for strategic and critical materials, including molybdenum, tungsten, refractory and metallurgical grades of chromite, mica splittings, and nickel. The Bureau also estimated requirements of equipment and other capital investments for expanding mining, beneficiation, and further processing of coal, iron, copper, nickel, magnesium, zinc, aluminum, fluorspar, and other nonferrous minerals and metals.

A major review of the Bureau's statistical canvassing program was undertaken. Commodity surveys were discussed at meetings with industry, detailed descriptions and justifications were prepared for all surveys sent to the Bureau of the Budget for clearance, and, where feasible, scientific sampling was used more often than previously. The Bureau also continued to collect special mineral-commodity facts required by various defense agencies.

Responsibility for conducting the Bureau's mineral-extraction surveys, other than fuels, was delegated to the regions, which negotiated new contracts for cooperative statistical canvasses with State agencies.

The Bureau decided to publish future editions of the Minerals Yearbook in three volumes—volume I, Metals and Minerals Other Than Fuels; volume II, Mineral Fuels; and volume III, Geographic Chapters.

## FOREIGN ACTIVITIES

Highlighting the Bureau's foreign-minerals activities during the year were extensive fact-finding and analysis service given to the Special Subcommittee on Minerals, Materials, and Fuels Economics of the Senate Committee on Interior and Insular Affairs and active participation in the Government's foreign technical-assistance program.

*Fact-finding and analysis.*—Through its various publications and through correspondence and interviews, the Bureau supplies industry, other Government agencies, and the public with information on foreign developments that influence world markets for minerals. In conducting this service, the Bureau maintains liaison with mineral attachés and other reporting officers of the Foreign Service of the Department of State.

During the year the Bureau assisted a special subcommittee of the Senate in an inquiry to determine accessibility of strategic and critical raw materials to the United States in time of war. Because this Nation receives a large part of its mineral supply from foreign areas,

facts regarding resources, technology, and production abroad and international trade were highly pertinent to the committee's study.

*Technical assistance.*—The Bureau continued to cooperate with foreign-aid agencies by making available its laboratory and staff in support of technical-assistance programs for underdeveloped countries. Consolidation of all foreign economic activities into the Foreign Operations Administration early in the year caused some readjustment of plans. All programs were reviewed in the light of newly established policies, and considerable time was spent in working out a cooperative arrangement under which the Bureau could function effectively in stimulating wiser use of mineral resources in those areas of the world receiving United States help. Although final agreements were not reached until late in the fiscal year, the Bureau conducted 11 foreign-assistance programs and completed preliminary work on 2 additional projects:

The Bureau's team in Afghanistan was enlarged to emphasize production of minerals other than coal, such as beryl and an unusually high grade chromite. In Brazil—the largest source in the Americas of industrial diamonds—special attention was given to improving recovery of this highly strategic commodity. In Colombia, India, and the Philippine Islands the Bureau was occupied chiefly with coal problems, while aid to Pakistan consisted of advisory services to the Government on the purchase of coal-gasification and other equipment for use in a fertilizer plant now under construction there.

The Bureau has been helping Israel to evaluate the commercial possibilities of its mineral resources and to establish an ore-dressing laboratory; also tests have been conducted in the Bureau's laboratories on Israel's known deposits of phosphate rock and copper. Under Bureau guidance, Nepal is organizing Government services to foster development of its mineral resources. Cooperating with the Mexican Government, a Bureau team developed a mobile ore-testing laboratory to help small mine operators improve metallurgical efficiencies.

Work in Cuba shifted during the year from training Government engineers in commercial appraisal of mineral deposits to assistance in establishing an ore-dressing and analytical laboratory. The Bureau made progress in its own laboratories in developing a method for separating copper from manganese ores in an effort to help the Hashemite Kingdom of Jordan exploit its manganese deposits.

Early in fiscal year 1955 a mineral adviser is scheduled to go to Liberia to assist in formulating a mining code designed to encourage foreign capital to invest in development of that country's mineral resources. An ore-dressing expert will be assigned to Peru to help the Government expand and improve its metallurgical laboratories and increase recoveries in several of its custom mills.

Training of foreign technicians continued, a total of 20 from 11 different countries having worked in Bureau laboratories or received other Bureau training during the fiscal year. Of these, 6 were awarded the Bureau's Certificate of Merit for successfully completing 6 months or more inservice training. The others were still on duty at the close of the year or had received only short periods of training.

## PUBLIC REPORTS

The Bureau of Mines, as directed by its organic act, reports results of its research and investigations in its own publications and in contributions to the scientific and technical press. Manuscripts of such reports, approved and edited during the fiscal year, totaled 587.

Printed publications totaled 167, including 11 bulletins, 130 Minerals Yearbook chapters and 2 bound volumes with extensive indexes, 6 miners' safety circulars, 4 handbooks, and 14 miscellaneous items. Processed reports totaled 164, including 77 reports of investigations, 30 information circulars, 12 Mineral Trade Notes, and 45 miscellaneous items. Articles for the technical press totaled 256. In all, more than 37,000 pages of manuscript were edited and about 2,000 technical illustrations prepared for printing or processing.

Several new records were established by the Bureau in its informational motion-picture program. Showings of industry-sponsored films dedicated to conservation and efficient use of mineral resources reached a new high of 214,698. The number of cooperating distributing centers in leading audiovisual libraries at schools, colleges, and State educational agencies increased to a record 180.

New film subjects dealing with utilization of minerals were added to bring the total number of titles circulated to 63 and the total number of prints to approximately 6,200.

These noncommercial films were used more widely in teaching such subjects as conservation, economic geography, manual arts, and chemistry. More than 30 million people are estimated to have seen the Bureau's films during the year, either at group showings or on non-commercial television programs.

## ADMINISTRATION SUMMARY

Completion of many additions to the Bureau of Mines Manual, a reduction in the number of motor vehicles, advancements in the incentive awards program and employee safety program, and savings of approximately \$2,500,000 in personnel costs were among the many attainments of administrative offices of the Bureau during the fiscal year 1954.



Several parts of the Manual were issued during the year, and preparation of other sections continued at a steady pace.

Thorough property inventories were completed at 58 of the Bureau's 83 field stations and were nearing completion at the remaining 25. The Bureau's motor-vehicle fleet had been reduced by 95 at year's end, an 8-percent drop from the previous year's 1,170, without impairing operating efficiency. Adoption of an excess-property and warehousing program resulted in disposal of \$100,000 in property and an additional saving of \$2,000 annually in cancellation of warehouse leases.

Further economies resulted from the Bureau's record-management program. Contents of many filing cabinets were destroyed or transferred to the Federal Records Center, making existing cabinets available for further use and reducing the purchase of new filing equipment.

Another significant attainment was the revision of the Bureau's accounting system on a modified cost-finding basis, which enabled the Bureau to determine more accurately the outlay for projects and to provide more efficient utilization of the taxpayer's dollar. Besides these advantages, better relations were established with business concerns and Bureau employees.

As of January 1, 1953, the Bureau had 5,197 full-time employees, but this number was reduced to 4,737 through rigid economies and improved utilization of personnel. Meanwhile, the Incentive Awards Program continued to save tens of thousands of dollars annually and resulted in improved employee relations, greater safety for workers, more healthful surroundings, and better public relations. Employee health and safety programs were guided through the office of the Bureau Safety Engineer. As in the past, the Bureau employed two commonly used statistical standards for measuring achievements in safety endeavors: (1) The frequency rate, or number of occupational injuries per million man-hours, and (2) the severity rate, or days lost per thousand man-hours. Accident-prevention measures are aimed to control the first; obviously, as long as accidental injuries occur, chance will be a factor in determining their severity.

The latest figures showed that for the second consecutive year the Bureau held its accident-frequency rate among employes to 9.28, the lowest in the 8 years of the employee safety program. The severity rate, however, increased to 1.07, chiefly because of the death of one employee and severe injury to another in a chemical laboratory explosion. To prevent recurrence, additional precautionary measures were adopted at this laboratory and similar installations.

TABLE 1.—Schedule and number of employees

	GS	CPC	Ungraded	Total
Departmental.....	593	10	-----	603
Field.....	3,032	174	928	4,134
Total.....	3,625	184	928	4,737

*Incentive awards.*—Following are some of the attainments under the incentive award program showing increased employee participation and increased savings to the Government:

Number of suggestions received during the year.....	169
Number of suggestions receiving awards.....	61
Total suggestions disapproved.....	99
Total of cash awards granted.....	\$2,943
Suggestions resulting in estimated annual savings.....	31
Total of estimated annual savings.....	\$61,825.60
Suggestions that resulted in intangible savings.....	30

*Property.*—Property records of the Bureau of Mines, as of June 30, 1954, show accounts as follows:

Automotive equipment.....	\$2,233,227.66
Canvas, composition, leather and rubber goods.....	24,370.83
Drafting and precision engineering instruments.....	125,017.93
Electrical equipment.....	529,994.11
Hardware.....	524,850.12
Household furnishings.....	127,309.55
Laboratory apparatus and appliances.....	7,966,870.65
Medical and surgical appliances.....	58,386.80
Office furniture, appliances, and floor coverings.....	2,671,186.23
Photographic and projection apparatus.....	315,045.41
Powerplant and general shop equipment.....	6,747,062.46
Real estate.....	23,386,659.72
Specialized equipment.....	773,790.42
Total.....	45,483,771.89

This property is in Washington, D. C., and at the various field stations and offices of the Bureau.

## FINANCE

The total funds available to the Bureau of Mines for the fiscal year ended June 30, 1954, including direct appropriations, prior-year balances available, reimbursements, advances, and transfers from other Government agencies, proceeds from helium operations, and contributions to trust funds from non-Government sources, were \$38,860,836. Of this amount \$32,307,211 was obligated, leaving an unobligated balance of \$6,553,625.

*Funds available to the Bureau of Mines for fiscal year 1954, by source of funds*

Direct appropriations-----	\$22, 713, 180
Prior-year balances available-----	5, 200, 600
Reimbursements from other Government agencies-----	441, 144
Advanced or transferred from other Government agencies-----	7, 176, 355
Proceeds from helium operations-----	3, 023, 442
Contributions to trust funds from non-Government sources-----	306, 115
<b>Total, Bureau of Mines-----</b>	<b>38, 860, 836</b>

*Obligations incurred by the Bureau of Mines in the fiscal year 1954, by appropriation*

Conservation and development of mineral resources-----	\$15, 280, 954
Health and safety-----	4, 827, 022
Construction-----	413, 264
General administrative expenses-----	1, 174, 278
Construction and rehabilitation, Bureau of Reclamation (transfer to Bureau of Mines)-----	128, 821
Working funds (includes all consolidated and allocated working funds)-----	7, 073, 148
Economic and technical assistance, Near East and Africa, executive (transfer to Interior)-----	80, 948
Administrative expenses, Mutual Security Act, executive (transfer to Interior)-----	38, 425
Technical assistance, American Republics and non-self-governing territories of the Western Hemisphere, executive (transfer to Interior)-----	5, 760
Economic and technical assistance, defense support, Asia and Pacific, other than Formosa and the Associated States of Cambodia, Laos, and Vietnam, executive (transfer to Interior)-----	174, 949
Mutual defense financing, defense support, economic and technical assistance, Europe, executive (transfer to Interior)-----	3, 353
Mutual defense financing, defense support, economic and technical assistance, Formosa and the Associated States of Cambodia, Laos, Vietnam, executive (transfer to Interior)-----	6, 694
Development and operation of helium properties-----	2, 611, 061
Contributed funds-----	488, 534
<b>Total obligations incurred-----</b>	<b>32, 307, 211</b>
<b>Unobligated balance, June 30, 1954-----</b>	<b>6, 553, 625</b>
<b>Total, Bureau of Mines-----</b>	<b>38, 860, 836</b>



## Oil and Gas Division

Hugh A. Stewart, *Acting Director*



**T**HE Secretary of the Interior, by Official Organization Handbook Release No. 9, of April 26, 1954, reestablished the Oil and Gas Division to take effect on May first.

Under supervision of Assistant Secretary—Mineral Resources, the Oil and Gas Division provides staff assistance on oil and gas matters; obtains coordination in the administration of Federal oil and gas policies; maintains contact with oil and gas industries and with State regulatory bodies; supervises activities of the Federal Petroleum Board in administering the Connally Act; and performs defense mobilization functions with respect to petroleum and gas.

The Division exercises the initiative in obtaining coordination and unification of oil and gas policies and related administrative activities of all Federal agencies. It advises other agencies and enlists their cooperation to assure adequate development, distribution and utilization of petroleum and gas resources and facilities to meet both civilian and military requirements. The Division is responsible for functioning of an Interdepartmental Petroleum Committee and Departmental Petroleum Committee.

The Division carries out petroleum and gas functions and responsibilities authorized by the Defense Production Act of 1950, as amended, and delegated to the Secretary of the Interior by and under Executive Order 10480, as amended, and Office of Defense Mobilization Order 1-7, as amended. The delegated functions are aimed at assuring adequate supplies of petroleum and products for civilian and military requirements. They include (1) assembling and presenting data concerning the supply of, and requirements for petroleum both for the United States and the free world, and similar information pertaining to gas for the United States; (2) recommending goals for expansion of industry capacity for approval by the Office of Defense Mobilization; (3) analyzing and preparing reports and recommendations to Office of Defense Mobilization for approval or denial of applications

from industry for accelerated tax amortization, available for defense related facilities under Section 124A of the Internal Revenue Code; (4) advising ODM with respect to use of other special incentives for expansion authorized by the Defense Production Act; (5) directing and coordinating work of the Foreign Petroleum Supply Committee, established under the Voluntary Agreement Relating to Foreign Petroleum Supply; and (6) furnishing information to ODM for programs with respect to petroleum production, refining, transportation, and storage, and the transmission and distribution of gas.

Defense mobilization functions include collaboration with the Department of Defense and ODM on petroleum security plans and participation in related activities under assignments from ODM in connection with its responsibilities under Reorganization Plan No. 3 of 1953.

The Division represents the United States on the North Atlantic Treaty Organization's Petroleum Planning Committee, which carries on studies of defense requirements of all participating countries.

The Division, since its reestablishment on May 1, 1954, has proceeded to align the organization to discharge its diversified and increased responsibilities and has carried on unfinished business of the Petroleum Administration for Defense, preparing studies and forecasts with respect to wartime requirements for petroleum and products. Of primary importance has been the day-to-day service of the Division in furnishing essential information and advice to other Government agencies.

The petroleum and gas industries continue to use the incentive of accelerated tax amortization, provided under the Internal Revenue laws. In the 2 months of May and June 1954, OGD made reports and recommendations for approval or denial of certificates of necessity on 19 new applications. Many requests for scope amendments on certificates already issued were analyzed and reports made as well as some requests for time extensions.

OGD's Acting Director, designated as representative of the Assistant Secretary—Mineral Resources, provided the leadership in collaborating with the Department of Defense representatives in the formulation of plans for effective functioning as early as possible of the reactivated Military Petroleum Advisory Board in order for Government to avail itself of expert counsel, advice and information on oil and gas matters relating to national security and defense. Within a month after the Board was established, the Assistant Secretary—Mineral Resources called the first meeting on May 25, 1954, at which the Chairman was elected and the basic rules and procedures under which the Board would operate were developed. For the first time the gas industry, which has become a major element in the Nation's

energy producing field, will have full representation on the Board through a gas transmission and distribution panel and committees.

The Secretary of the Interior continues to rely on the National Petroleum Council to provide the wisdom and experience of the oil industry on national petroleum matters as requested. Important studies initiated by the Petroleum Administration for Defense are well under way and these are required by the Oil and Gas Division in discharging its duties.

A Gas Industry Advisory Council was available for advice and consultation on problems with respect to gas in discharging responsibilities under the Defense Production Act.

The Foreign Petroleum Supply Committee, in addition to its work on foreign aviation gasoline reports, is actively engaged in the preparation of a major report on commercial deep water foreign petroleum storage and terminal facilities in friendly nations throughout the world. This is the first time that such a study has been undertaken. It will require several more months of work. When the report is finished, it will contain about 3,000 pages.

The Division also supervises the activities of the Federal Petroleum Board in administering the Connally Act. This act prohibits interstate shipment of oil produced in violation of certain State oil and gas conservation laws and orders issued thereunder. The Board acts as the field agency to initiate and conduct investigations, including the holding of hearings, with respect to the production and interstate shipment of such contraband oil with the view of supporting the oil and gas conservation policies of the respective States.

The Federal Petroleum Board, composed of a Chairman and two members, maintains headquarters at Kilgore, Tex. Suboffices are located at Houston and Midland, Tex., and Lafayette, La.

In adopting the Connally Act on February 22, 1935, the declared aims of Congress were (1) to protect interstate and foreign commerce from the diversion and obstruction of, and the burden and harmful effect upon, such commerce caused by the illegal production of oil, which is that produced in excess of legal amounts allowable as fixed under State laws, said illegal production thereby constituting waste of this natural resource, and (2) to encourage conservation of underground reserves of crude oil in the United States. These objectives were to be accomplished by deterring the production of and prohibiting the shipment or transportation in interstate commerce of all petroleum and its products produced in violation of conservation statutes under State laws, by authorizing injunctions in proper cases to restrain violations of the laws, and by instigating punitive action against offenders with consummated violations. Experience prior to and since 1935 has definitely demonstrated that without the



aid of the Federal Government, the States could not adequately enforce their conservation statutes in restraining an enormous waste incident to unbridled exploitation of their valuable petroleum deposits.

The conservation of petroleum in the United States is becoming recognized as a problem of increasing importance in its direct relation to the national welfare, both civilian and military. The problems of increasing petroleum reserves, of maintaining an emergency excess productive capacity, and of reduction or elimination of wasteful production practices are receiving more consideration than ever before.

While the Connally Act is applicable wherever State laws limit the rate of production and prescribe conditions for producing and handling of oil, its chief application is in the States of Texas, Louisiana, and New Mexico, whose regulations prescribed under the act are actively enforced by the Board in cooperation with the States. So far as is possible with the limited resources at its command, the Board also enforces the provisions of the act in other oil-producing States, particularly in Arkansas, Kansas, Mississippi, and Oklahoma.

The primary aim of the Federal Petroleum Board is to secure the maximum possible voluntary compliance with the State conservation laws, thereby minimizing the necessity for prosecution of violators under the Connally Act. Continuing inspections and investigations throughout areas where violations are suspected or reported, and prosecution of violators, serve as a deterrent of great impact against the illegal production of oil. Administration of the act is implemented through regulations which require producers, transporters, refiners, and others handling petroleum and its products in the designated area to keep operating records and file periodical reports with the Board. Presently the designated area consists of 106 counties in Texas, Lea and Eddy Counties in New Mexico, and the entire State of Louisiana.

From this designated area the Board currently receives and processes each month approximately 6,700 monthly producers' reports, 535 monthly pipeline reports, and 80 reports from processors and refiners. These reports cover operations in about 2,050 separate oilfields and account for approximately 36 percent of the entire domestic production of crude oil, or 70.3 million barrels each month.

During this fiscal year, some 3,550 leases were inspected, 2,180 leases were actually visited and checked, and 17 pipelines were checked. In the performance of this work 757 oilfields were visited and 1,120 interviews conducted.

During the fiscal year this Board, assisted by 9 examiners and other supporting staff, carried on the operations after the force of examiners was reduced by 5 employees in order to stay within the

limits of a budget reduction of 24.7 percent from the previous year. Nineteen cases were on the docket during this year. Of these, 9 cases were closed; 5 of which were closed by prosecution resulting in imposition and payment of \$21,425 in fines. At the end of the fiscal year 10 cases were still pending, 3 in an investigative stage, and 7 with the Department of Justice and United States attorneys.

Cooperation between the Division and State regulatory bodies was maintained, through the direct contact of the Board with State conservation agencies and by the Acting Director of the Division in serving as the official representative of the Department of the Interior to the Interstate Oil Compact Commission.

# Petroleum Administration for Defense

Joseph A. LaFortune, *Deputy Administrator*



**R**ESPONSIBILITIES pertaining to petroleum and gas were delegated to the Secretary of the Interior under the Defense Production Act. As Petroleum Administrator for Defense, the Secretary established the Petroleum Administration for Defense to carry out these functions. This Administration was terminated on April 30, 1954.

In the fiscal year activities of the Petroleum Administration for Defense had been fully discharged through the cooperation of the oil and gas industries in supplying top flight personnel.

Controls on all materials, except nickel-bearing steel alloys, ended on June 30, 1953. Allocation of stainless steel was also discontinued at the end of September 1953.

Oilfield machinery and equipment were in ample supply. Therefore, in July, defense mobilization responsibilities for production and distribution of oilfield machinery and equipment which the National Production Authority had delegated by an interagency agreement to the PAD were returned to the NPA.

Well drilling exceeded the record breaking rate of the calendar year 1952. Forty-nine thousand, two hundred and seventy-nine wells were drilled in 1953. It appears that in the calendar year 1954 the number of wells drilled will exceed the previous year's all-time record. Crude oil production was averaging some 6,400,000 barrels a day in 1953.

Refinery construction was progressing satisfactorily. High demand for petroleum products and gas continued. Meeting the military demand for aviation gasoline was still a matter of concern, but with the armistice in Korea it appeared that the enormous demand for aviation gasoline would lessen somewhat.

Construction of oil and gas pipelines continued on schedule and the calendar year 1953 set new records for pipeline construction. About 7,353 miles of principal crude oil and products pipelines were



constructed and placed in operation during the calendar year 1953. This pipeline program cost approximately \$400 million. In the same period about 21,090 miles of utility gas pipelines were constructed and put in use. In a review of the oil and gas supply position for strategic defense planning, PAD gave special study and attention to the possible need for additional oil pipeline capacity which might be needed in event of a war.

In the last few years natural gas had been recognized for the first time as a vital munition of war and an important fuel in the Nation's domestic economy. The amount of gas marketed in the calendar year 1953 was more than twice that marketed in 1945. Natural-gas utility sales were 53,194 million therms in 1953, as compared to 22,563 million therms in 1945.

## REVOCATION OF PAD ORDERS

PAD Order No. 4 set up the minimum quantities of tetraethyl lead that could be included in commercial aviation gasoline. It was placed in effect October 19, 1951, and was necessary to assure meeting the military requirements for aviation gasoline. With marked improvement in the aviation gasoline supply position, the order was rescinded on October 1, 1953.

PAD Order No. 3 was another order designed to increase the output of aviation gasoline. It restricted the use, delivery, and receipt of certain blending agents, such as alkylate, and feed stocks, such as isobutane and butylene, usable in the manufacture of aviation gasoline. A review of the aviation gasoline supply position indicated that avgas production had been built up to a level adequate to meet both military and civilian requirements for the foreseeable future, barring another critical national emergency. But to provide an appropriate period of time for any necessary adjustments by the military as a safeguard for the immediate future, the order was suspended for three months on October 1, 1953. It was terminated on December 1, 1953, at the end of the suspension period.

The revocation of these orders signaled the successful handling of the most troublesome and persistent problem of the PAD's entire history.

All of the 6 orders which the PAD had found it necessary to impose on the oil and gas industries in order to discharge the PAD defense mobilization responsibilities had been lifted. In so doing, the PAD had fulfilled its promise that orders would remain in effect only so long as they were absolutely essential to assure the basic objectives of meeting the military and essential civilian requirements for petroleum and gas during the mobilization period.

## FOREIGN PETROLEUM SUPPLY

General improvement in the foreign petroleum supply situation continued throughout the fiscal year. By December 31, 1953, the harmful influence upon world petroleum supply resulting from the shutdown in Iran had been overcome. All restrictions and controls with respect to aviation gasoline were discontinued. Here, during the Korean crisis as in the United States domestic petroleum supply situation, aviation gasoline was the last product to be in a critical supply position.

A change of government in Iran during August 1953 gave more promise that the basic difficulty which resulted in the withdrawal of Iranian oil from world markets might be satisfactorily resolved. Discussions involving the Iranian Government and the Iranian National Oil Co. with a group of British, American, French, and Dutch oil companies with full knowledge of their governments appeared to be making headway toward a solution of the introduction of Iranian oil in the world markets on a sound basis.

PAD had found that the Foreign Petroleum Supply Committee, organized under the Voluntary Agreement Relating to Foreign Petroleum Supply, of May 1, 1953, was the effective source of information required to keep the PAD and other interested Government agencies, particularly the Department of Defense, sufficiently advised on foreign petroleum activities.

It was equally essential that the mechanism of the voluntary agreement be continued for the benefit of PAD's successor organization, the Oil and Gas Division. Accordingly, after the required consultations with the Attorney General and Chairman of the Federal Trade Commission, the Director, Office of Defense Mobilization, on April 15, 1954, approved procedural amendments of the agreement. No alteration of substance was made. Members of the Foreign Petroleum Supply Committee accepted the amendments and the Secretary of the Interior appointed the membership of the Committee. The Committee continued its studies and prepared the foreign aviation gasoline reports.

The PAD completed a survey of the refining capacity in the free-world nations outside the United States. The survey indicated that refining capacity abroad will increase by the end of 1955 to a point 40 percent greater than it was at the end of 1951.

## NORTH ATLANTIC TREATY ORGANIZATION

As during 1953, PAD continued to provide the United States representative on the Petroleum Planning Committee of the North Atlantic Treaty Organization, who participated in the work and meetings of

the Committee. In addition, the representative was Chairman of the Committee's working group.

## ACCELERATED TAX AMORTIZATION AND DEFENSE LOANS

The petroleum and gas industries continued to use the incentive of rapid tax amortization provided by section 124A of the Internal Revenue Code for industry expansion to meet defense mobilization goals. As of April 30, 1954, PAD had received 2,129 applications for accelerated tax amortization for oil and gas expansion projects with a total estimated cost of \$5,937,673,000. A total of 1,674 projects costing about \$4,305,065,000 had been recommended for approval as of that date. Virtually all recommendations made by the PAD were approved by the Office of Defense Mobilization.

## INDUSTRY COOPERATION

In addition to the services of the technical and executive personnel made available to the emergency defense agency, the Secretary of the Interior and Petroleum Administration for Defense utilized the services of hundreds of people in the petroleum and gas industries through the National Petroleum Council, Military Petroleum Advisory Board, Gas Industry Advisory Council, Military Fuels General Advisory Committee, Military Fuels Technical Advisory Committee, and the Foreign Petroleum Supply Committee.

Oil and gas matters relating to national security and defense which had been carried on by the Military Petroleum Advisory Board since March 1947 were performed by the Petroleum Administration for Defense during the existence of that agency. To continue to provide Government, particularly the Departments of the Interior and Defense and the Office of Defense Mobilization, with expert counsel, advice and information on a classified basis concerning matters of petroleum security and defense, it was necessary that an organization be set up for that purpose. To attain that objective the Secretary of the Interior reactivated the Military Petroleum Advisory Board on April 30, 1954, by Order No. 2756. It is composed of 24 outstanding technical experts in the oil and gas industries.

The Military Fuels General Advisory Committee and the Military Fuels Technical Advisory Committee were utilized for obtaining advice on highly technical matters, particularly with respect to refining and the technical problems involved in meeting military fuels specifications.



## EMPLOYMENT

The PAD started the fiscal year with 93 employees on its staff. At the end of April 1954, there were 65 employees on the rolls. Of these, 33 were full-time paid employees, 1 executive serving full time without compensation, 2 salaried consultants, and 29 consultants on the without-compensation basis. The Secretary of the Interior approved the transfer of all of these employees to the Oil and Gas Division as of May 1, 1954.

## TERMINATION OF THE PAD

The Secretary of the Interior on April 23, 1954, by Order No. 2755, transferred to the Oil and Gas Division certain functions and powers vested in the Secretary of the Interior by delegations or redelegations issued pursuant to the Defense Production Act of 1950. By Official Organization Handbook Release No. 9, of April 26, 1954, the Secretary of the Interior transferred all personnel, funds, and property of the Petroleum Administration for Defense to the Oil and Gas Division, Department of the Interior.

# Defense Minerals Exploration Administration

C. O. Mittendorf, *Administrator*



**D**URING the fiscal year 1954, the Defense Minerals Exploration Administration vigorously pursued a program, under a delegation from the Office of Defense Mobilization to the Secretary of the Interior, to explore for deposits of strategic and critical minerals and metals in the United States, its Territories and possessions.

Through DMEA the Government furnishes financial assistance on a participating basis to the mining industry for exploration purposes. Specific projects for exploration are established by contract in which the Government participates to the extent of 50 or 75 percent of the cost, depending upon the mineral sought. Funds for the Government's share of the project cost are made available under the borrowing authority provided by the Defense Production Act of 1950, as amended. The amount contributed by the Government to the cost of a project is repayable on a percentage royalty basis from the net sales receipts for any ore produced from the property covered by the exploration contract.

DMEA continued to carry out the exploration program during the fiscal year 1954 with a small Washington staff and five field auditors. Technical field services were provided through the cooperation of the Bureau of Mines and the Geological Survey. Industry participation in the program included individuals, partnerships, and corporate enterprises. The participation of small operators was especially noteworthy.

From the beginning of the program in mid-1951 to June 30, 1954, 2,221 applications for Government aid in exploration have been received from 42 States and Alaska. Requests for aid during the fiscal year 1954 were received for 307 projects. During this year DMEA executed 130 contracts, bringing the total number of contracts executed since the inception of the program to 647. These contracts include exploration projects in 31 States and Alaska. The number of contracts in force at the beginning of the fiscal year stood at 325, climbed

to a peak of 344 in October 1953, and dropped to 249 at the end of the fiscal year. Since the beginning of the program a total of 56 contracts have been canceled without any work being done on the projects. Government commitments in contracts executed in the past 12 months have been \$4,166,166, bringing the total to date to \$19,371,100. Industry participation in the past 12 months has been \$2,479,475, and the total to date amounts to \$12,446,624.

Eighty certifications of discovery or development of deposits of strategic and critical minerals and metals were issued during the past fiscal year. These 80 certified projects totaled \$4,166,658 in contract value. On these projects the Government was committed to participate to the extent of \$2,636,003, but only \$2,090,108 was actually spent by the Government. Previous to June 30, 1953, 52 projects had been certified. Thus, the total number of projects certified by DMEA as of June 30, 1954, was 132, having a total contract value of \$5,794,733. The Government's participation in these projects was set at \$3,587,063. Of this amount, the contract cost to the Government was only \$2,834,915, due to work on several projects having been completed at less cost than estimated and also due to a number of certified projects still being in operation. As of June 30, 1954, repayments to the Government by operators under DMEA contracts amounted to \$323,856. Five operators have repaid in full the amounts of the Government's participation in their projects.

The 132 certified projects covered exploration for antimony, asbestos, beryl, cobalt, copper, corundum, fluorspar, iron, lead, manganese, mercury, mica, monazite, nickel, rutile, sulfur, talc, tungsten, uranium, and zinc. Twenty-three of the certified projects were in North Carolina, 18 in Colorado, 15 in Utah, 11 in Idaho, 10 in Arizona, 7 in South Dakota, 6 each in Montana, Washington, and Wisconsin, 5 in California, 4 in Nevada, 2 each in Arkansas, Georgia, Missouri, New Mexico, and Vermont, and 1 each in Alaska, Florida, Illinois, Iowa, Maine, New Hampshire, New Jersey, South Carolina, Texas, Virginia, and Wyoming. Twenty-one of the one hundred and thirty-two certified projects had not been terminated as of June 30, 1954. On a conservative basis at prices in effect at the end of the fiscal year, the recoverable minerals and metals in the ores found on the 132 certified projects are estimated to have a gross value in excess of \$120 million. Substantial ore showings have been disclosed on 68 other projects, which have not advanced sufficiently to furnish information warranting ore estimates but which may eventually be certified.

Work was performed on 121 projects which were terminated without certification of discovery or development during the fiscal year 1954. The estimated cost of these 121 terminated contracts originally totaled \$3,096,407, with Government participation set at \$2,000,515.



The actual cost to the Government, however, was only \$1,193,505. At the beginning of the fiscal year, 112 contracts had been terminated. Thus, since the defense minerals exploration program was instituted, 233 contracts have been terminated without certification. These contracts had an estimated total cost of \$5,383,776. The Government's share in the cost of these contracts was estimated at \$3,533,790, but only \$1,950,557 was expended by the Government. Sufficient ore has been found on some of these 233 terminated projects to warrant their certification, which will follow in due course. A few have found small quantities of ore but not sufficient to justify their certification; however, the termination agreements contain a provision for payment of royalties to the Government if any production is made during a period of 10 years from date of the contract. On the other terminated projects valuable geological information was obtained.

All applications received from operators for financial assistance for exploration are analyzed and studied by technical experts. In the majority of cases, an onsite field examination is made of the proposed project by DMEA field teams comprising personnel of the Bureau of Mines and Geological Survey. Based upon the results of this field work, either a project is approved and a contract made, or the application is denied. A total of 1,008 applications have been denied, 201 during the past fiscal year, and a total of 413 applications have been withdrawn, 85 during the past fiscal year.

The number of applications received during the first 6 months of the fiscal year 1954 declined progressively, but this trend was reversed during the second half of the fiscal year, so that the high monthly rate of applications received in the fiscal year 1953 was approached in the last 3 months. These trends reflected the Government's actions in (1) removing, effective May 15, 1953, 19 minerals from the list of strategic and critical minerals eligible for exploration assistance; (2) eliminating, effective November 3, 1953, further contract arrangements wherein the Government would participate to the extent of 90 percent of the cost of the project, and eliminating 5 additional minerals from those eligible for Government exploration; and (3) restoring, effective March 23, 1954, 19 minerals to the eligibility list.

During the fiscal year 1954, the Contract Administration and Audit Division continued auditing project accounts at a rapid rate. As of June 30, 1954, a total of 475 project audits (covering Government disbursements of \$7,186,950) had been made. Of these, 246 audits (covering Government disbursements of \$3,518,126) were made during fiscal 1954. The Division has completed audits of approximately 68.8 percent of the exploration program disbursements.

By reason of budgetary exigency and in view of the decline in the rate of receipt of new applications, DMEA issued reduction-in-force

notices to 18 percent of its staff in February. The Bureau of Mines and Geological Survey made a similar reduction in personnel assigned to DMEA work.

DMEA issued amendment No. 3 to DMEA Order No. 1 and subsequently issued DMEA Order No. 1, amended, to incorporate parts of previous amendments and to change the order so as to conform with the current program. Amendment No. 3 was issued in compliance with the Office of Defense Mobilization directive of August 31, 1953, eliminating further contract arrangements which obligate the Government to stand 90 percent of the cost, as well as eliminating five minerals from those eligible for exploration assistance, thus further restricting assistance to specific minerals in shortest supply. On March 23, 1954, DMEA issued DMEA Order No. 1, amended, pursuant to ODM directive of February 9, 1954, reinstating 19 minerals as commodities eligible for exploration assistance, thus making a total of 33 eligible minerals for which the Government's share of the cost for approved exploration work is either 50 or 75 percent. The amended order also restated the "allowable costs" of an exploration project, clarified and made more specific the provisions for "repayment by operator," and made other minor changes for the protection of the Government's interests.

Extension of the Government's buying programs for asbestos, beryl, chromite, mica, manganese, tantalum-columbium, and tungsten, changes in mica specifications, and further clarification of titles to mining claims filed on lands held under oil and gas leases with respect to uranium aided in the stimulation of exploration.

Although some projects are recessed until more favorable prices prevail, it is anticipated that the Government's announced policy of purchases for the national stockpile will encourage the operators to restart their projects. Substantial quantities of minerals have been found; and although current production is small, principally from ore removed during the exploration work, the ultimate production from successful projects undoubtedly will be important to the national economy and defense. In addition, during the search for higher grade deposits, currently uneconomic mineral deposits have been found which can be brought into production in times of emergency. These latter deposits constitute a reserve of strategic minerals which is an important element in the Nation's mobilization base.

# Defense Solid Fuels Administration

W. F. Hahman, *Administrator*



**T**HE Defense Solid Fuels Administration, which was established in December 1950 to handle the responsibilities of the Department in respect to the mobilization of solid fuels for defense, was abolished at the close of business on June 30, 1954. The continuing responsibilities of the Department for the mobilization of solid fuels were delegated to the Director of the Bureau of Mines, effective July 1, 1954.

During fiscal year 1954, the Defense Solid Fuels Administration was concerned principally with the problems relating to attaining an adequate capacity of facilities for the mining of coal of metallurgical quality and the production of coke. The relation between coal requirements and mine capacity in Alaska also received considerable attention.

On July 1, 1953, the staff of DSFA consisted of nine employees two of whom were assigned to the Office of the Secretary for half of the fiscal year while investigating the coal situation in Alaska. On June 30, 1954, when DSFA was abolished, there were only four employees.

## COKE PROGRAM

The coke program was one of the most important problems during fiscal year 1954 and will continue to be a problem in fiscal year 1955.

The Office of Defense Mobilization anticipates that by January 1, 1955, blast furnaces in operation will have an annual capacity of 83,000,000 tons of pig iron. This will require a capacity of 84,000,000 tons of coke to operate not only the blast furnaces at capacity but also to meet the requirements of other industrial users of coke. Some of the requirements will be provided by beehive ovens but the major production will have to come from byproduct ovens.



In addition to the 83,000,000 tons of pig iron capacity expected to be in operation by January 1, 1955, necessity certificates have been issued for an additional capacity of 2,000,000 tons of pig iron. At the time of preparing this report, it does not seem likely that this capacity will be needed nor that the certificate holders will proceed with construction. If this additional blast furnace capacity should be built, an additional capacity of 1,800,000 tons of coke will be required; however, these additional capacities could not possibly be in production until calendar year 1956.

The base date for measuring progress toward achieving the coke goal is January 1, 1950. The capacity of byproduct coke ovens at that time, as reported by the Bureau of Mines, was 73,710,000 tons. On January 1, 1954, the capacity, as reported by the Bureau of Mines, was 78,258,000 tons. Capacity on June 30, 1954, has been estimated at 79,209,000 tons and by January 1, 1955, is expected to be 79,725,000 tons, providing all coke oven batteries now operating remain in operation and are not dismantled because of age or for economic reasons.

The problem of coke capacity sufficient to meet defense needs is a continuing and important problem. During fiscal year 1954, DSFA with its limited staff maintained, within budgetary limitations, a close analysis of the status of byproduct coke capacity. During fiscal year 1955 the Department plans to make further detailed studies of defense requirements for coke and the ability of byproduct and beehive ovens to supply these defense requirements. An uncertain factor in estimating future capacity is the loss of production which is anticipated at public utility plants which face abandonment because natural gas is displacing coke oven gas. The Department will follow these developments closely and if necessary recommend steps to overcome any losses in capacity, if such losses affect the defense program. A related study is planned to measure the regional capacity of coal mines to supply coal of suitable metallurgical quality sufficient to operate the coke industry at capacity.

## COAL IN ALASKA

A field study of the coal situation in Alaska was made by the former Administrator of DSFA and by two members of the staff of DSFA, who were assigned to this study for 6 months of the fiscal year. The report was completed in December 1953 and after review by the Department was submitted to the Secretary of Defense for comments, particularly with reference to military requirements for coal during the next 4 years.

Production of coal, which was around 400,000 tons in 1950, increased to about 900,000 tons in 1953 and by June 30, 1954, the capacity of coal mines in Alaska was sufficient to meet all current military and civilian demands. Defense loans, accelerated tax amortization and particularly American business enterprise are responsible for this remarkable increase in production.

If military requirements increase as anticipated, additional productive capacity will be required. The Department during fiscal year 1955 will continue to measure future requirements and promote expansion in capacity if expansion is required.

## NECESSITY CERTIFICATES

Reports and recommendations on 30 applications for necessity certificates under section 124A of the Internal Revenue Code were submitted to the Office of Defense Mobilization during the fiscal year. Twenty-five were recommended for certification and five were recommended for denial. At the end of the fiscal year no applications were pending with DSFA but there was a small backlog of requests for reconsideration of denials.

Fourteen applications for facilities to produce byproduct coke and coal chemicals were recommended for certification. Based on estimates supplied by the applicants, the total investment is approximately \$202,000,000 and construction will be spread over the next 3 or 4 years. The proposed facilities involve the construction of new ovens which will increase annual capacity by about 2,700,000 tons and the reconstruction of old ovens which will help maintain an annual capacity of 3½ to 4 million tons. On a national basis, it is anticipated that these gains in capacity will be partially offset by loss of capacity in old batteries and the abandonment of capacity due to economic conditions, particularly at public utility plants.

Nine applications for mining equipment and preparation facilities, estimated to cost \$11,000,000, at mines producing metallurgical coal, were recommended for certification. Four applications were recommended for denial.

In addition to the above, one application for a coal mine in Alaska and one for a coal carbonizing plant in Wyoming were recommended for certification and one for a coal washing plant in Pennsylvania was recommended for denial.

In fiscal year 1955, the Department, through the small staff assigned to this work, will continue to analyze new applications, requests for extensions of time, amendments in amount, and reconsideration of applications previously denied.

During the period from December 1950 to June 30, 1954, DSFA made recommendations on 274 applications for necessity certificates

with a total estimated cost of nearly a billion dollars. About \$700,000,000 was recommended for certification at an average rate of 64 percent, i. e., approximately \$448,000,000 of the cost can be amortized in 5 years.

### DEFENSE LOANS

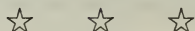
No applications for defense loans under the Defense Production Act of 1950, as amended, were received during fiscal year 1954; however, one application pending from the previous fiscal year was recommended for denial.

From December 1950 to June 30, 1954, inclusive, DSFA received 32 applications for defense loans, totaling \$27,228,928. Five applications, amounting to \$4,372,775, including \$240,000 for refinancing an undischarged loan, were recommended for approval. Twenty-four applications, totaling \$20,095,993, were denied and four, totaling \$2,760,160, were withdrawn by the applicant during the course of negotiations. Of the 5 loans recommended, 1 was for \$2,200,000 for the construction of a new battery of beehive coke ovens in Pennsylvania and the other 4, in the amount of \$2,172,775, were for coal mines in Alaska.



## Division of Geography

Meredith F. Burrill, *director*



THE Division of Geography was established to carry out the duties of the Secretary of the Interior under the act of July 25, 1947, conjointly with the Board on Geographic Names. The Division performs the research and other staff functions relating to the standardization of geographic names.

The Division's work in 1954 was again mainly concerned with areas outside the continental United States. Geographic and linguistic research was carried out leading to the standardization of approximately 200,000 geographic names for use by Federal agencies. More than 250,000 tabulating cards were punched for subsequent publication of gazetteers. These figures represent substantial increases over similar services rendered to Federal agencies in previous years and reflect improved efficiency of operations.

In addition, over 450,000 names on maps and in texts prepared in various agencies were edited for correctness of spelling and accuracy of application. About 15,000 standard names were supplied to inquirers by telephone and mail, and research briefs were prepared for over 2,500 formal decisions.

Substantial contributions were obtained from a new source of names information, namely, scholars in foreign universities under contract to supply research data on foreign names. Such data from institutions in Rome and Beirut assisted materially in the standardization of over 13,000 names in independent Arabic and Persian speaking areas.

Although, except for its inquiries service, the Division's research and staff work continues to be addressed almost wholly to names immediately required by those agencies providing working funds, real progress has been recorded. As the basic files of names processed by the Division and approved by the interdepartmental Board are continually enlarged and refined it becomes increasingly possible to meet the needs of most agencies for foreign names. A program designed to meet the needs for domestic names in comparable measure and fashion has been developed and presented for the year 1956.

## United States Board of Geographic Names

The Board on Geographic Names is an interdepartmental organization established for the purpose of standardizing geographic nomenclature for use by the Federal Government. Representatives of 11 Federal departments and agencies make up its membership. Dr. H. Thompson Straw, Department of the Air Force, became chairman during the fiscal year 1954.

The Board and its committees held frequent meetings during the year to act on policies, names, publications and related matters. Basic foreign name policies were formulated to cover new areas and policies were extended and amended for areas and classes of names previously covered. The volume of the Board's activity is reflected in the statistical data included in the report of the Division of Geography.

More than 3,500 decisions were published in lists covering Canada, Mongolia, the Guianas, Peru, Hawaii, Alaska, Puerto Rico, and the United States.

The Advisory Committee on Arabic and Persian, in weekly meetings, examined and approved several thousand individual names in independent Arabic-alphabet countries. The Advisory Committee on Names in Alaska, reconstituted and redesignated the Alaskan Names Advisory Committee, rendered valuable service in providing information on Alaskan nomenclature problems. The Advisory Committee on Antarctic Names continued its work on the coast of Wilkes Land. The appointment of a fourth advisory committee, on Hawaiian names, was recommended.

REPORT ON THE PROGRESS OF THE WORK

FOR THE YEAR 1900

The work of the Department during the year 1900 has been characterized by a steady and continuous progress in all the various branches of the study of the history of the United States. The most important of these branches are the history of the Republic, the history of the States, and the history of the people. The progress has been made in the following manner:

1. The history of the Republic has been studied in its various aspects, and the progress has been made in the following manner:

2. The history of the States has been studied in its various aspects, and the progress has been made in the following manner:

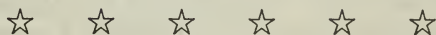
3. The history of the people has been studied in its various aspects, and the progress has been made in the following manner:

1900



# Office of the Assistant Secretary Public Land Management

Orme Lewis, *Assistant Secretary*



THE Assistant Secretary for Public Land Management discharges the duties of the Secretary of the Interior with respect to Indian and territorial affairs and the utilization and management of more than 500 million acres of public lands in the United States and Alaska.

Within this vast area lie the bulk of the Nation's undeveloped natural resources—its national parks and monuments; its refuges for wild game and fowl; and, most importantly, multitudes of pioneering people whose efforts may well hold the key to America's future greatness.

In the discharge of his responsibilities, the Assistant Secretary exercises Secretarial direction and supervision over the Bureau of Land Management, the Bureau of Indian Affairs, the National Park Service, the Fish and Wildlife Service, and the Office of Territories.

During the year all five of these agencies effected reorganizations which reversed the tendency to centralize authority in Washington and brought operating responsibility and more effective service closer to the people they serve in the field.

Wherever possible, these agencies discontinued activities which had outlived their usefulness or caused unjustified interference with individual rights. For instance, the Puerto Rico Reconstruction Administration sold its holdings to the people or to their Territorial government, and prepared to be out of business by February 15, 1955; in the Virgin Islands, the Federal Government got out of the hotel business by selling Bluebeard's Castle to private investors; in the United States the Bureau of Indian Affairs made a good start in its program to terminate unwanted, unneeded supervision over the affairs of Indian tribes whose social and economic advances have made such action long overdue; and, the Fish and Wildlife Service amended its procedure to eliminate the old irritating and unnecessary "period of secrecy" that preceded announcement of migratory waterfowl hunting regulations.

In the development and conservation of the Nation's resources—both human and physical—aggressive actions were taken by all five

of the agencies within the Office of the Assistant Secretary for Public Land Management.

The Bureau of Indian Affairs advanced toward three major goals: (1) provision of educational opportunities for all Indian children; (2) better health protection in Indian homes and communities; and (3) broadening of economic opportunities for Indian wage earners. Accomplishments included providing facilities for some 8,000 Navajo youngsters who never before had an opportunity to go to school; action leading to transfer of the Indian health program to the Public Health Service; and operation of a successful relocation service which helps Indians move away from the reservation to find jobs in communities where employment opportunities are more abundant and rewarding.

The National Park Service and the Fish and Wildlife Service continued to make great contributions to the cause of intelligent conservation. The scenic treasures of the great national parks were preserved intact, while the area administered by the National Park Service was increased by 368,000 acres, largely through extension of the boundaries of Everglades National Park and acquisition of land inside the boundaries of other parks. The Fish and Wildlife Service, likewise, expanded its protection of waterfowl over large areas of wetlands.

A revitalized public land program was developed following reorganization of the Bureau of Land Management. Transfer of operating authority from Washington to Bureau offices in each of the Western States, where the bulk of the public lands are located, filled a long-standing void in public land policy. Now the claims of citizens to public lands and leases can be settled expeditiously on the spot by the people who manage and know the lands. Time-consuming delays and costly negotiations through intermediaries in Washington are avoided.

The response of homesteaders, prospectors, ranchers, farmers, and industry to the Department's program of use without abuse of the land has been healthy and encouraging.

The rate of settlement of lands and minerals cases advanced from 40,000 a year before reorganization to the current rate of 100,000 a year. And this was accomplished without an appreciable increase in personnel.

The rights of individuals to claim lands and minerals under the many land laws enacted by Congress are being strictly observed. The rights of States to extensive school section lands in the public domain were recognized. The task of surveying the public domain has been speeded up to enable the States to select the lands to which they are entitled.

A start was made on development of the untold wealth of the submerged lands on the Outer Continental Shelf. Leasing maps were prepared covering 12 million acres off the Louisiana and Texas coastlines. These formed the basis for bids which brought some \$140 million into the Federal Treasury as a bonus for the rights to lease about 800,000 acres of submerged land.

Conservation work on the Federal range was accelerated and plans were made for a 20-year program of soil-conservation work. As the year ended, soil-conservation projects had been installed on about 18.5 million acres of Federal range. Over a million acres of depleted range have been revegetated; more than 100,000 acres were reseeded last year. The sustained-yield forests managed by the Bureau produced their greatest yield in their history.

In territorial areas, the Office of Territories made progress in its historic mission of providing increasing opportunities for territorial peoples to participate in representative government. A revised Organic Act for the Virgin Islands was drafted and sent to Congress and has now been enacted. The Government of the Trust Territory of the Pacific Islands was reorganized.

One example of the sound business practices introduced into the Territories was the infusion of new management into The Alaska Railroad. The railroad, which lost \$800,000 in 1952 and \$42,000 in 1953, made a profit of \$766,000 last year.

A more detailed report of the accomplishments of the five agencies within the jurisdiction of the Assistant Secretary for Public Land Management follows.





## Bureau of Indian Affairs

Glenn L. Emmons, *Commissioner*



**F**URTHER narrowing in the scope of Bureau activities and sharper focusing on major Indian problems were the two primary trends for the Bureau of Indian Affairs during the 1954 fiscal year.

One of the first major developments contributing to a reduction of Federal responsibilities in Indian affairs was the passage of Public Law 280, approved August 15, 1953. This law brought Indian lands in California, Minnesota (except the Red Lake Reservation), Nebraska, Oregon (except the Warm Springs Reservation), and Wisconsin (except the Menominee Reservation) under the criminal and civil jurisdiction of the five States mentioned and largely relieved the Bureau of further law enforcement duties in the affected areas. Some staff work was necessary, however, to facilitate the transition toward full assumption of jurisdiction by the States. The transfer, which was approved in advance by all five of the States and by the major Indian groups involved, produced no serious or outstanding problems during the fiscal year.

Just two weeks before the approval of Public Law 280 another important development looking toward reduced Federal participation took place when the Senate passed by voice vote House Concurrent Resolution No. 108 which had previously been adopted by the House of Representatives. This Resolution had three main features. First it declared that the policy of Congress is to make the Indians of the United States, as rapidly as possible, subject to the same laws and entitled to the same privileges and responsibilities as other citizens. Secondly, it stated the "sense of Congress" that nine specifically designated aggregations of Indians (i. e., those residing in 4 States and 5 additional tribal groups) should be freed from Federal supervision and control at the earliest possible time. Thirdly, it called upon the Secretary of the Interior to submit recommendations for legislation which would accomplish the purpose of the resolution with respect to the designated groups.

In compliance with this mandate, the Bureau consulted with the Indian groups involved as fully as time permitted in the fall of 1953 and then sent forward legislative recommendations designed to achieve the intended purpose. These were transmitted to Congress by the Department at the beginning of the 1954 congressional session. The recommendations covered the Indians of California, Florida, New York, and Texas; the Flathead Tribe of Montana; the Klamaths of Oregon; the Menominees of Wisconsin; the tribes of Kansas and Nebraska under jurisdiction of the Bureau's Potawatomie field office; the Chippewas of the Turtle Mountain Reservation in North Dakota; and one additional group not included in the concurrent resolution—the Indians of western Oregon. Legislation for the latter group was submitted without regard for the congressional mandate since the Indians had on several occasions expressed a desire for early termination of Federal trusteeship over their property and affairs.

In addition to these recommendations submitted by the Department, three other bills designed to terminate Federal responsibilities for particular Indian groups were introduced during the congressional session—one covering a number of small bands and groups in Utah, another involving several of the Indian colonies and reservations in Nevada, and the third providing for a division of assets between the mixed-blood and full-blood elements on the Uintah-Ouray Reservation in Utah. This last bill was regarded as particularly significant since it was developed chiefly by the Indians themselves with only incidental help from the Bureau. Under its provisions Federal responsibilities for the mixed-blood group on the Reservation would be terminated in 7 years and a development program for the full-blood segment would be authorized to prepare them for assumption of full independence at a later date.

Although hearings were held on all of these "termination" bills except in the case of the New York Indians, the only one actually enacted during the fiscal year was the Menominee legislation which was approved as Public Law 399 on June 17. Under its provisions the tribe has until December 31, 1958 to prepare for termination of Federal trusteeship and special services, and is authorized to employ management specialists for the development of tribal plans and programs during the interim period. Other termination bills which were sufficiently advanced in the legislative process at the close of the fiscal year to make their enactment seem likely during the 83d Congress were those covering the Klamaths and the coastal Indians of Oregon, the small bands of Utah, the Uintah-Ouray group, and the Alabama-Coushatta Tribes of Texas.

Two other important pieces of legislation designed to narrow the scope of Indian Bureau responsibilities were introduced. One was



H. R. 303 which would transfer all of the Bureau's health activities and responsibilities to the United States Public Health Service. The other was S. 3385 which would transfer the Bureau's extension program (including agricultural assistance, home demonstration work, and 4-H Club activities) to the Department of Agriculture for administration by the land-grant colleges of the several States. The Department submitted favorable reports on both bills. Although neither was enacted during the fiscal year, H. R. 303 was passed by the House and both bills were under active congressional consideration as the period ended.

Several major developments of the year contributed to or reflected a sharper focusing of Bureau manpower and resources on outstanding problems and needs of the Indian people.

One of these was a survey of the Bureau's administrative organization and program activities carried out in the fall of 1953 by a secretarially appointed team consisting of three business men, two Departmental representatives outside the Bureau, and one congressional staff member. In accordance with the recommendations of the team, an extensive reorganization of the Bureau was launched and largely carried through to completion during the latter half of the fiscal year. The result should be a more closely knit organization better equipped to deal effectively with the truly urgent problems in Indian affairs.

Also in the fall of 1953 the newly appointed Commissioner of Indian Affairs, Glenn L. Emmons, made an extensive tour of the major Indian areas of the country in response to a specific suggestion by the President. The Commissioner's primary purpose was to learn firsthand about the problems and needs, hopes and aspirations of the Indian people. Following completion of the tour in November, top-priority attention was given to three outstanding problems: (1) a broadening of educational opportunities to accommodate all Indian children of school age at the earliest possible date, (2) provision of better health protection or preventive medicine service in Indian homes and communities, and (3) the creation of greater opportunities for Indian economic advancement through a combination of development activity on or near the major reservations and continued assistance to the Indians in off-reservation relocation. During the balance of the fiscal year substantial progress was made in all three areas of activity.

The most urgent education problem demanding Bureau attention was found on the Navajo Reservation where nearly half of the school-age population was unable to attend school during fiscal 1954 primarily because of lack of facilities. Following a quick survey of the situation by Washington staff people in December, plans were drawn up for a Navajo emergency education program aimed at providing school opportunities by the fall of 1954 for nearly 8,000 Navajo children

in addition to the total of more than 14,000 previously enrolled. The plans involved (1) construction of new facilities and enlargement of existing facilities on the Reservation, (2) greatly expanded use of trailer-type schools in the more isolated localities, (3) increased enrollment of Navajo children in Bureau boarding schools off the Reservation, and (4) provision of dormitory facilities in communities bordering the Reservation where Navajo children could be enrolled in the regular public schools. By the end of June all phases of the program were moving forward at an encouraging pace with good prospects for achievement of the announced goals during fiscal 1955.

In the direction of better health protection the Bureau took steps during the year to enlarge its preventive medicine activities on reservation areas throughout the country. Sanitary engineers were added to the staff at the Aberdeen, Albuquerque, Billings, Minneapolis, Portland, and Juneau area offices and 18 additional young Indians were trained as sanitarian aides at the Phoenix Medical Center for duty on the reservations. Upon completion of the course, it was contemplated that these aides would work under supervision of the professional sanitarians bringing the benefits of modern sanitation measures directly into Indian homes and communities.

On the economic front plans were developed during the year under the leadership of Commissioner Emmons for a series of reservation surveys to be conducted under private auspices and without cost to the Government. Three prominent citizens interested in Indian affairs—Lawrence F. Lee, former president of the United States Chamber of Commerce, David T. Beals, president of the Interstate National Bank of Kansas City, Mo., and Dr. Clyde Kluckhohn of Harvard University—were persuaded to take the lead in organizing a nonprofit corporation for this purpose. The thought was that the corporation would solicit grants from private foundations for financing the surveys and that the studies would actually be conducted by organizations specializing in this type of work. It was contemplated that the surveys would provide the basis for additional economic development and greater Indian employment opportunities in and around several of the major reservation areas.

## NAVAJO-HOPI REHABILITATION

The most significant development of the year under the long-range rehabilitation program for the Navajo and Hopi Tribes was the rescheduling of school construction work in accordance with the objectives of the Navajo emergency education program. As indicated above, the plans called for a substantial increase in reservation school facilities by the fall of 1954.

Under the irrigation phase of the program studies of the feasibility of the proposed San Juan-Shiprock project were continued in cooperation with the Bureau of Reclamation and construction progress was achieved on both the Hogback and Red Lake projects. At Hogback 6 miles of canal excavation and about 45 percent of the structural work were completed. At Red Lake the west side main canal, laterals and distribution system were finished and 800 acres subjugated.

Road construction work advanced chiefly on route 3, between the New Mexico line and a point near Cameron, Ariz., along a route which was given top priority with the concurrence of the Navajo Advisory Committee. Work was completed on 26.1 miles of grade, 43.3 miles of surface, and 25.1 miles of bituminous surface. In addition, 4.5 miles of surface was completed on a section of route 8 between Chinle Junction and Chinle.

Other noteworthy accomplishments under the long-range program included the near completion of a new 75-bed hospital at Tuba City, the drilling of 51 additional wells for range water supply, appointment of a business manager and business management committee by the Navajo Tribe, continued progress in soil and moisture conservation, and further activities in ground water studies and mineral surveys.

## PROGRAM DEVELOPMENT

One of the Bureau's most important projects during the first half of the fiscal year was the development of drafts of terminal legislation in compliance with the congressional mandate of House Concurrent Resolution No. 108. In carrying out this assignment, Bureau personnel gave special emphasis to consultation with the Indian groups affected and the State and local agencies concerned.

The procedure followed consisted of three major steps: (1) a preliminary draft of a proposed bill, covering each of the designated Indian groups, was developed solely for discussion purposes by area directors, superintendents, and central office staff; (2) representatives of area and agency offices arranged for meetings with Indian people, officials of State and local governments, and other interested persons to discuss with them the preliminary draft and invite an expression of their views and suggestions; and (3) proposed bills and basic information relating to the Indian groups were prepared and submitted to Congress through departmental channels.

The wide variations between the tribes and groups in development of resources, progress of integration into the local community and other factors made it necessary to modify the proposed legislation to fit the needs of each tribe or group. Basically, however, all of the bills were designed to accomplish three specific purposes; (a) termi-



nate Federal trusteeship over tribal and individual property; (b) terminate special Federal services, and (c) give Indians the same status as other citizens in the States in which they reside.

Certain features were common to practically all of the bills. One of these was a provision making the tribe responsible for preparation of a tribal roll but also giving individual members the right of appeal to the Secretary. When the final roll is established, each member of the tribe is given a personal property right in the undivided tribal assets and, after termination of trusteeship, may dispose of his individual interests as he wishes. As far as the tribal group is concerned, it may either organize into a corporation for the continued management of its property or arrange for a transfer of title to a trustee of its choice. If the tribe fails to exercise an option, the Secretary will transfer title to a trustee of his choice for liquidation purposes only, with the understanding, however, that for an additional period of 6 months the tribe may still select a course offered under the option. The bills also provide that individually owned property is to be transferred to the respective owners and that all trust patents will be converted into fee patents on a specified date. They stipulate that the Secretary is to protect the rights of any individuals who are not able to manage their own affairs, and provide finally that when the Federal trust is terminated, the Secretary is to publish a proclamation to that effect and the Indians concerned will be in the same status as other citizens and have all the rights, privileges, and responsibilities.

The time period for completing the adjustment programs under the proposed legislation varies from 2 to 5 years, depending upon the time needed for an orderly transition and adjustment.

*Menominee.* On June 17, 1954, a monumental step was taken in the Federal administration of Indian affairs when President Eisenhower signed into law H. R. 2828 (Public Law 399) which provides for the end of Federal supervision over the property and affairs of the Menominee Indian Tribe in Wisconsin. This legislation represents the culmination of many years of planning directed toward preparing the Menominees to assume their place in the non-Indian society and was developed when it was mutually agreed by the Menominee Indians, the Congress, and the Bureau that the Menominee Tribe was prepared for a program leading to the full and unrestricted management of its own affairs. The legislation, in recognition of the accomplishments of the Menominees in handling their affairs, provides a framework within which suitable arrangements for a termination of Federal supervision may be accomplished by December 31, 1958.

## MISSOURI RIVER BASIN PROGRAMING

Three hundred fifty families of the Fort Berthold Reservation were required to move because of closure of the Fort Garrison Dam. These families were assisted in the relocation of buildings, in the procurement of domestic and livestock water supplies, and in the appraisal, sale, acquisition, and trading of land to effect desirable land consolidations. By June 30, 281 families had been completely relocated, and 54 were in the process of moving.

## BUREAU REORGANIZATION

In October, 1953, a survey team was appointed by the Secretary to study the organization and operating procedures of the Bureau of Indian Affairs. Three months later the team completed its study and submitted its final report to the Secretary, who approved the recommendations and instructed the Bureau to begin at once putting them into effect. Most of the organizational changes recommended by the team were effected during the fiscal year, with some modifications as approved by the Secretary, and certain additional changes in organization developed as a result of Bureau action. The reorganization was directed toward giving greater coordination and cohesion to the diverse functional activities and widely scattered field offices of the Bureau, and involved three major types of organizational changes: consolidation of functions, decentralization of operations, and consolidation of offices.

### *Consolidation of Functions*

The Bureau's soil conservation and irrigation activities, which were formerly conducted by separate branches, and the range management function, previously associated with forest management in another branch, have been merged into a new Branch of Land Operations. This consolidation, carried out at all levels of the Bureau's organization, will give greater coordination to these closely related programs and also reduce the number of supervisory positions necessary to give direction to the programs. The Bureau's extension activity was also scheduled for inclusion in the Branch of Land Operation unless it should be transferred to the Department of Agriculture through legislative action.

The Division of Program and the Branch of Management Planning in the Division of Administration were abolished, and their functions

were transferred respectively to the newly established Program Coordination Staff and Management Research Staff under the direction of assistants to the Commissioner. The Information Office was also included in the Management Research Staff.

### *Decentralization of Operations*

The headquarters of the Branch of Buildings and Utilities, which supervises the construction of facilities required to carry out the Bureau's programs, was transferred from Washington to Albuquerque, N. Mex. Since a large volume of new construction work now under way or contemplated is located in the southwest region, principally on the Navajo and Hopi Reservations, the new location places the Bureau's construction staff close to the scene of operations. Along with the change of location, construction staffs were removed from all area offices except Juneau, Alaska, and consolidated in the new national headquarters. Simultaneously, the responsibility for maintenance of buildings and utilities was transferred from the Branch of Buildings and Utilities to the Branch of Property and Supply at the area level, and the staff for this function was retained at the area offices. The total effect of this change has been a reduction in supervisory and technical positions and expenses. There is also a gain in efficiency through the shortening of lines of communication and greater utilization of staff specialists resulting from consolidation of the construction personnel in one location.

During the year plans were also made for transferring the headquarters of the Branch of Relocation from Washington to Denver, Colo. A study of the operations of this function revealed that greater efficiency and economy could be achieved through the consolidation of the staff and central location in a western region, easily accessible to the field relocation offices and the area offices. This office will be able to provide staff assistance to the area directors without having staff personnel located in the area office on a full-time basis, thereby making it possible to give greater emphasis to the direct operating function of assisting Indian workers to relocate in industrial and other areas where employment is available.

### *Consolidation of Field Offices*

On April 1, 1954, the former Window Rock and Albuquerque area offices were abolished and a single area office at Gallup, N. Mex., was established in their stead. This change reduced the number of area offices from 11 to 10 and also eliminated two of the situations where the combined area office-agency organization existed.



### *Other Organization Changes*

The Branch of Credit was transferred from the Division of Resources to the Division of Administration. This change is being effected at all levels of the Bureau's organization to achieve closer association with the accounting and finance activities of the Bureau. The Resources and other appropriate program personnel will continue to advise as to the feasibility of various loan applications.

Plans were also made for transferring the Hopi Agency at Keams Canyon, Ariz., from the former Window Rock area to the jurisdiction of the Phoenix area. This transfer, however, is merely an administrative move and does not affect the substantive rights of the Hopi or Navajo Indians with respect to the land involved.

One other change of note was the removal of the audit function from the Fiscal Section and its establishment as a separate branch in the Division of Administration. This change is designed to provide an effective internal auditing procedure independent of the fiscal activity.

## HEALTH ACTIVITIES

Death and disease among the Indians continued to decline. Yet the health of the Indian people, although improved, remained at a level below that of the general population. Proportionately, the Indian population during 1953 has 20 times as many deaths from measles as did the non-Indian population, 9 times as many deaths from tuberculosis, 4 times as many deaths from pneumonia and influenza, 3 times as many infant deaths, and twice as many accidental deaths. Heart disease, cancer, apoplexy, and other causes of death associated with advanced years of life were relatively infrequent among the Indians, a reflection of the much shorter average life span of these people.

Tuberculosis remained the most frequent cause of serious illness and disability. As in past years, the next most important illness requiring hospital care was diarrhea and enteritis in infants and young children. In terms of frequency of occurrence, dental caries and upper respiratory infections are still high as leading causes of health impairment.

### *Medical and Hospital Care*

At the beginning of the 1954 fiscal year, 59 hospitals were being operated by the Bureau. During the year the new 400-bed medical center at Anchorage, Alaska, was opened; operations were suspended, however, at Wind River, Wyo., and Warm Springs, Oreg. By the end of the year 58 hospitals were in operation with a total authorized bed capacity of 2,840 divided as follows: 1,473 general, 1,292 tuberculosis,

and 75 orthopedic. On an average day these beds were utilized by 1,250 general patients, 1,190 tuberculosis patients, and 60 orthopedic patients.

Additional patients were cared for through contractual arrangements with hospitals operated under community or other auspices. On an average day, care was provided under this type of arrangement for 590 tuberculosis patients, 210 psychiatric patients, and 100 other patients at a total yearly cost of approximately \$3,480,000.

As a means of adding to the effectiveness of the treatment of tuberculosis patients, three institutes in rehabilitation techniques were held for Bureau medical and nursing personnel. In addition, medical-social worker positions were established in the sanatoriums, medical centers, and area offices for the purpose of assisting tuberculosis patients and their families to understand the type of treatment required for the cure of the disease, and for the purpose of aiding patients in meeting the financial and personal problems which arise as a result of the disease.

To improve the utilization of drugs and medications, and assure a proper control of narcotics, a pharmacy program was initiated through the employment of qualified pharmacists in the Anchorage Hospital, Phoenix Medical Center, Talihina (Okla.) Medical Center, and the Washington office. The improved program for supplying pharmaceutical services will support the increased attention being given to modern medical procedures and better patient care.

The problem of securing sufficient staff continued in 1954. At the beginning of the year 145 medical officers were employed, 90 of whom were on detail from the Public Health Service; 138 were on duty at the end, 80 of whom were on detail from the Public Health Service. In order to meet this problem of adequate numbers of medical personnel, exploratory work was carried on at various medical colleges throughout the United States regarding the possibility of their assisting in staffing the larger Bureau hospitals through contractual agreements. The initial result was an arrangement whereby the Cornell Medical Center of New York supplies the Navajo Medical Center with a tuberculosis clinician. This plan not only will provide additional staff but improve the quality of service as well.

An energetic recruitment program as well as continuous interpretive efforts on the part of area and central office staff to improve living conditions and provide job incentive opportunities brought about some stabilization of nursing personnel, and reduced the high turn-over rate. Additional public health nurses were recruited, additional nurse-teaching positions established and filled, and a number of highly qualified, experienced personnel assigned to key nursing positions heretofore vacant. Advances were also made in relation to improvement of personnel policies, living conditions, and job incentive opportunities.

*Public Health and Preventive Services*

It will be noted that the leading causes of death and disability among the Indians are those which have given way in the general population before the impact of well organized, sustained programs of prevention. Preventive and public health services of the Bureau were aimed at a continuation and improvement of tuberculosis control, dental health, sanitation, and health education.

The tuberculosis control program continued to stress the finding of new cases through the widespread use of Chest X-rays, chemotherapy, and increased use of chest surgery. Voluntary BCG vaccination of the newborn was continued. A tuberculin testing of school children by the Henry Phipps Institute for comparison with the result of the tuberculin test in comparable tribal and age groups in 1935-36 revealed that the infection rate among Indian children has been very substantially lowered. The use of isoniazid in the treatment of tuberculosis patients continued at the Navajo Medical Center in cooperation with the Cornell Medical Center of New York.

A survey of health problems in Alaska was initiated in 1954 under contractual agreement with the School of Public Health, University of Pittsburgh. As a result of this survey, a decision was made to initiate a program of chemotherapy of tuberculosis cases awaiting hospital admission. Such a program should hasten the time when the rate of tuberculosis among Alaska natives is brought down to the level of the general population in the United States.

During the year the program to improve sanitation of Indian homes and communities was given special impetus as a part of the drive to lower the major causes of disease and death among the Indian populations. Of major importance was the recruitment and orientation of 18 additional Indian sanitarian aides. The field staff of professional or technical personnel was increased to provide a total of 10 sanitary engineers, 3 sanitarians, and 33 sanitarian aides, the latter to be located in key spots of the reservations and Alaska. Special emphasis is given to the development and protection of family and community water supplies, construction and maintenance of facilities for the disposal of excreta, refuse and garbage, and the control of flies and other insects. The work is carried out in cooperation with Indian tribal councils, as well as with State and local health agencies; it is directed to an eventual integration of these services with the State and local governments.

Contractual arrangements were further expanded with State, local, and community groups in the implementation of a policy of transferring responsibility for health activities and services to local facilities or to the Indian himself, wherever suitable facilities, services, and attitudes can be found.



Dental services were modified in 1954 to concentrate both control and preventive services in the areas of severest need. Community dental programs have been established in areas where contractual agreements can be set up. These result in more preventive control, protective services, and conservation of teeth for the cost involved than could otherwise be obtained.

Cooperation on health education increased during the year with State health departments, private organizations, and universities. The Bureau collaborated with private and university radio stations in presenting broadcasts on Indian health problems. An intensive educational campaign was initiated for the health of Indian seasonal agricultural workers. Educational projects were also carried on in selected areas to reduce infant deaths, to inform Indian leaders about tuberculosis control, basic sanitation, and healthful living conditions. Reservation health personnel initiated and assisted in producing a teaching film in the Navajo language for Navajo adults on the control of diarrhea and enteritis in young children. A training program was inaugurated to prepare Indian aides to assist and interpret in connection with community health education activities and in preventive health work. The expanded health educational program provides for six public health educators and for closer working relationships with comparable personnel in the health departments of key Western States.

## EDUCATION

Total enrollment of Indian children, ages 6 to 18, in schools of the United States and Alaska during fiscal 1954 was estimated at approximately 104,000. More than half, 56.1 percent, were in public schools, 34.1 percent in Federal schools, and 9.8 percent in mission and other schools.

In 1954 the Bureau negotiated contracts with 15 States, 28 districts in 4 other States, and the Territory of Alaska, under the Johnson-O'Malley Act, covering reimbursement for the education of Indian children in the public schools. When these States were given the alternative of applying for Federal aid under Public Law 874 (81st Cong., 2d sess.), all elected to remain under the Johnson-O'Malley contract status.

The Bureau operated during the year a total of 85 boarding schools, 193 day schools, 18 instructional aid schools, 6 trailer and 5 hogan schools, enrolling approximately 36,500 children. At four locations, where the instruction function was transferred to the public school districts for all of the grades, the Bureau maintained dormitory facilities for approximately 600 additional children enrolled in the public schools. Instruction was furnished to more than 300 children convalescing in four sanatoria operated by the Bureau.

More than 75 percent of the children enrolled in Federal schools in 1954 were fullblood Indians, and only about 5 percent were less than halfblood. To qualify for enrollment in Federal schools, children must be at least one-fourth degree Indian blood.

Vocational schools continued maintaining placement records of graduates. In four of the schools sampled for graduate placement—Chemawa, Albuquerque, Phoenix, and Sherman Institute—the following results were observed:

Out of 229 total graduates, 47.2 percent were in jobs related to their training; 14 percent in other jobs not related to training; 6.5 percent were in the armed services; 12.2 percent continued training; 1.7 percent were housewives; 4.4 percent were awaiting placement and 11.8 percent returned to the reservation. The present status of 2.2 percent was unknown.

New curriculum materials developed by the Branch of Education and made available to teachers in Bureau schools included Minimum Essential Goals for Indian Schools at grade levels 7, 8, 9, 10, 11 and 12. These materials serve as basic curriculum guides and are designed to meet the special needs of Indian children.

Over 500 employees from the Indian schools of United States and Alaska attended the 1953 summer school at their own expense. The summer school for in-service training of educational personnel was held at Intermountain School, Brigham City, Utah, June 1 to 28. The theme was the problems of cultural change.

One other major development of the year was the formulation of the Navajo emergency education program referred to above.

## WELFARE

In the welfare field the Bureau continued its activities designed to strengthen family life when found to be unstable, to encourage a proper use of family income, to assist persons toward self-support, to protect children, and to stimulate youth toward independence. Engaged in this work were 38 social workers operating in 27 of 46 local jurisdictions of the Bureau, directed by 9 area social workers with the assistance of 5 area child welfare workers.

### *General Assistance*

Increased general assistance was necessary in areas of the Southwest due to drouth and in Alaska due to failure of the salmon run. The drop in cattle prices affected all areas where raising stock is a source of livelihood, and policies in regard to grazing permits caused problems on the Navajo.

In some areas it has been difficult to determine justifiable need due to overwhelming applications for assistance. Patterns of communal sharing, late application for available jobs, selection of migratory and seasonal labor rather than steady, covered employment, taking jobs and leaving them, and poor use of income bring large groups back to the reservation without adequate provision for winter months. However, in other areas improved methods of relief administration, encouraging migratory workers to budget their summer earnings to help meet winter needs, and planning with families to budget income from oil bonuses and various leases on a monthly basis reduced to a considerable extent wasteful expenditure, and increased the ability of the family to care for its own needs.

### *Social Services*

The necessity for granting assistance was the earliest reason for the placement of a social worker in an agency. While assistance is still a problem, the demands of the agencies are changing as they are meeting more and varied requests for welfare services. Fort Hall, Idaho, required a worker skilled in developing leadership on the reservation, a worker who could bring groups of people into common thinking and united action to better their living conditions and help them develop understanding and the use of a wide range of available resources including not only the usual services but also the vocational and art programs of the State college, the eye program of the State Board of Health, and business consultation of interested private persons. Such services will gradually assist the Indian to organize his personal and financial resources toward self-reliance and independence.

### *Services to Indian Tribes*

In Portland, Oreg., the Court of Domestic Relations and the juvenile programs of the police department are always open to members of tribal courts and many have taken advantage of the opportunity to observe court procedure and program. The White River Apache secured the services of the National Probation and Parole Association to make a study of juvenile delinquency on the reservation. Their study "Good People in Bad Trouble" was presented simply but tellingly and translated so that the information and recommendations were available to every tribal member. The Southern Ute employ a tribal welfare worker to visit neglected old persons, helping them buy their food, giving them automobile rides and, in general, providing the care that is ordinarily furnished by immediate family relatives.



During the year members of the Jicarilla Apache Tribe and the Ute Mountain Ute Tribe each assumed tribal responsibility under the guidance of the Bureau for protecting the interest of minors in the per capita distribution and allocation of tribal funds. The Jicarilla Apache Tribe is entering an agreement to establish a Minors' Trust Fund in a commercial bank operating under New Mexico State's law. The Ute Mountain Ute Tribe is assuming responsibility for protecting minors' interests in Ute Mountain tribal rules and regulations for family plans.

Members of other tribes, such as those at Southern Ute and Uintah and Ouray, also showed development in the assumption of greater family responsibility and more prudent management of minors' funds according to principles of parental guardianship recommended to their respective tribal business managers or officers in charge of tribal affairs.

### *Services to School Children*

During the fiscal year approximately 5,000 studies of individual children in Bureau boarding schools or in mission schools were made or reviewed, and progress was achieved in planning for children who are in these schools for other than educational reasons. Children have been enabled to attend public school through arrangements for free lunches, changes in bus routes, and by the provision of clothing and other school necessities. Once in public school, effort is made to see that there are no obstacles to adjustment. Indian parents who have long looked upon the boarding school as a right, and who have found the care of their children by the school to have economic advantages, have discovered anew the pleasure of having their children at home and have put forth effort to reestablish and unify the family. In some cases of extreme parental neglect, foster care has been provided.

### *Federal-State Relationships*

Although few States accept full welfare responsibility for the Indian, some would, had they sufficient staff and funds. Since the welfare program, staff, and appropriation vary in each State, as does the Indian population in relation to the total population, consideration of contractual relationships must also vary. Contracts were negotiated in fiscal 1954 with Minnesota for foster care and general assistance in distressed counties and with Wisconsin for foster care. Negotiations were begun with Nevada and South Dakota for social services and foster care of children on a selective basis.

## RELOCATION

During the 1954 fiscal year, 2,163 Indians were directly assisted to relocate under the Bureau's relocation program. This included 1,649 persons in over 400 family groups, and 514 unattached men and women. In addition, over 300 Indians left reservations without assistance to join relatives and friends who had been assisted to relocate. At their destination, Bureau Relocation Offices assisted this group also to adjust to the new community. The total number of relocations represented a substantial increase over relocations during the previous fiscal year.

Of the 2,163 Indians assisted to relocate, financial assistance, to cover all or part of the costs of transportation to the place of relocation and short-term temporary subsistence, were provided to 1,637 Indians, in addition to relocation services. This number included 1,329 persons in over 300 family groups, and 308 unattached men and women. An additional 526 Indians, including 320 in approximately 100 family groups and 206 unattached men and women, were assisted to relocate without financial assistance, but were provided relocation services only. These services included counseling and guidance prior to relocation, and assistance in establishing residence and securing permanent employment in the new community.

In addition to the above-mentioned persons who were assisted to relocate, Bureau Relocation Offices assisted a number of Indian workers to secure employment which did not involve relocation, and cooperated with public employment offices and the Railroad Retirement Board in recruitment of Indians for temporary and seasonal work. However, in order to concentrate on providing relocation services, placement activities which do not involve relocation have been progressively decreased and responsibility for such placement activities has been largely left to established employment agencies. In recognition of this emphasis, and following the recommendation of the survey team for the Bureau of Indian Affairs, the name of the former Branch of Placement and Relocation was changed during the year to the Branch of Relocation.

Approximately 54 percent of the Indians assisted to relocate came from 3 northern areas (Aberdeen, Billings, and Minneapolis), and 46 percent came from 4 southern areas (Anadarko, Gallup, Muskogee, and Phoenix). They went to 20 different States. The Los Angeles and Chicago metropolitan areas continued to be the chief centers of relocation.

On the reservations there was continued interest in relocation throughout the year. Relocation assistance funds were used up in almost every area, and at the end of the year there was a backlog of applications for relocation. Letters from relocated Indians to friends

and relatives back on the reservation, describing their experiences and new standards of living, served to stimulate interest as did a decrease in employment opportunities in the vicinity of some of the reservations and a marked decrease in railroad employment.

There was a slight tightening of the labor market during part of the year. However, through intensive efforts on the part of field relocation offices, it was still possible to assure permanent types of employment to almost all qualified workers who requested assistance in settling away from reservations. Field relocation offices followed a policy of securing employment for Indians in diversified industries and with a large number of employers. This policy proved of great benefit when industrial disputes developed in certain industries on the west coast.

To adjust to changes in the labor market which reduced employment in military installations and certain Government projects, the field relocation office formerly located in Salt Lake City was transferred to Oakland, Calif., effective June 1.

The Chicago Field Relocation Office, in recognition of the needs of the growing number of relocatees in that city and in accordance with the Bureau policy of encouraging the development of non-Bureau facilities for Indians, assisted in the establishment of an All-Tribes American Indian Center in Chicago. This center raised its own funds, and under the directorship of a board composed almost entirely of Indians, began providing opportunities for Indian relocatees to meet, engage in social and recreational programs, exchange experiences, and assist each other. Its operations were completely independent of the Bureau.

## LAW AND ORDER

The most important development of the year in this field was the enactment of Public law 280 referred to above. Separate bills for each of the five States covered by the legislation and, additionally, for Nevada had been introduced early in the Congress. The House Committee on Indian Affairs consolidated all the bills, except for Nevada, into one which was enacted as Public law 280.

An amendment was made to the bill before enactment which provided for the assumption of jurisdiction by additional States over Indian country. This amendment was criticized by a number of Indian groups because it did not provide for Indian consent or consultation and they urged the President to veto the bill for that reason. When the President approved the bill, he stated that he did so because of the fact that its basic purpose represented an important step in granting complete political equality to Indians. At the same



time, however, he requested the Congress to enact an amendment requiring consultation with Indian groups and Federal approval before additional States acted to assume jurisdiction under Public law 280. A number of such bills, including some sponsored by the Department, were being considered by the Congress at the close of the fiscal year.

The enactment of Public law 280 has enabled the Bureau to reduce expenditures for law-enforcement purposes although this reduction was not as great as might be supposed because much of the expense of law enforcement in the five States affected by the law had previously been borne by the Indian tribes themselves.

The transition from Federal and tribal jurisdiction to State jurisdiction in the five States was accomplished with very little friction and unrest. A question as to whether the transfer of jurisdiction was effective was raised by an Oregon court but that court, after studying the matter, held that it had jurisdiction and proceeded to exercise it. The ultimate result of the law has been to guarantee the Indians police protection that they themselves had been unable to furnish. The Menominee Tribe, which had objected to inclusion in Public law 280, during the year changed its mind and, at a general council meeting in April, adopted a resolution asking the Congress to amend the law so as to extend the State laws to the reservation.

During the year the Bureau continued its efforts to improve law and order conditions by seeking more efficient operation by tribes and Bureau personnel, encouraging assumption of more responsibility by the tribes in the field of law enforcement, and by conducting training schools for law enforcement personnel. Correspondence was had with the Governors of various States with Indian populations, calling their attention to Public law 280 and offering Bureau assistance in consulting Indian tribes. Negotiations with Indian tribes looking to extension of State laws to the reservations continued.

A long-sought Bureau goal was attained during the year when the Congress enacted Public law 277, approved August 15, 1953, which removed the discriminatory prohibition against the sales of alcoholic beverages to Indians outside of Indian country and provided for legalizing the introduction of alcoholic beverages within Indian country by the tribes on a local option basis. Although the Indians generally welcomed the removal of the discriminatory prohibitions outside of Indian country, only 19 tribal groups acted during the fiscal year to legalize the introduction of alcoholic beverages within their reservations.

## REALTY TRANSACTIONS

During fiscal 1954 the program of transferring to the Indians themselves, either as groups or individuals, the responsibility for management of their trust and restricted properties continued at an increased rate. A total of 1,551 patents in fee, certificates of competency, and removals of restrictions were issued to Indians in this year as compared to 839 such actions in fiscal year 1953. There were 1,609 sales to non-Indians and 46 other transactions of various kinds which resulted in removal of the trust responsibility of the Federal Government. In all, more than 3,200 tracts of land were removed from trust or restricted status during the fiscal year or nearly 3 percent of the approximately 112,600 tracts in such status on June 30, 1953. These 3,200 tracts comprised a total of 500,000 acres, about 3½ percent of the acreage held by individuals. The acreage removed from the trusteeship of the Federal Government in 1954 was about 50 percent greater than in fiscal 1953. Eighty-eight tracts were purchased from non-Indians for tribes and individuals.

In addition, there were 1,572 transactions completed during the year which had no material effect on the overall acreage of land in trust or restricted status. These included sales between individual Indians, exchanges between individual Indians, sales from individuals to tribes, exchanges between individuals and tribes, conveyances of title as gifts, and other transactions including exchanges with non-Indians. These transactions assisted individuals in obtaining land for homes, blocking out pastures for grazing livestock, and obtaining better operating units. In some cases the sales between individuals represent the acquisition by one of the heirs of the interests of the other heirs. The gifts in most cases are made to members of the family, other members of the household or relatives. Many of the sales from individuals to tribes convey title to lands which will not or cannot be used by the owners but which are important to the tribes and their members because of water supply or location.

On June 30, 1954, field offices of the Bureau reported an uncompleted workload or backlog of 13,104 proposed realty transactions. Included in this total are 640 requests for patents-in-fee, 4,725 requests for supervised sales, 672 exchanges of various kinds, 139 proposed partitions, 225 requests for removal of restrictions, 24 applications for certificates of competency which, in effect, remove the trust status of the lands owned by the applicant, 1,385 farm and farm pasture and business leases, and 803 mineral and oil and gas leases, 411 rights of way, and 2,219 cases involving preparation of information required for probating estates.

At the end of the year, the total backlog of work was about the same as at the beginning of the year. During the year local Indian agency offices reported that more than 27,000 transactions of various kinds were disposed of either by approval, disapproval or in some other manner. The incoming number of transactions of various kinds, however, was about equal to the number handled. Of the 27,000 cases handled, 13,910 were related to farm and business leases, 3,518 were mineral and oil and gas leases, 476 concerned rights-of-way, and 2,059 involved probating of estates.

Only 7,213 cases contributed to the program of the Bureau to transfer, as soon as feasible, to the Indians themselves, the management of their property, or to improvement in the ownership pattern of the land in contemplation of the termination of supervision of the Government over certain groups of Indians. From a study of the time required to act on and issue patents-in-fee and complete other kinds of transactions, it is estimated that there is a backlog of more than 1 year's work for the entire staff now engaged in this activity.

During the year negotiations were completed with the tribes of the Wind River Reservation in Wyoming for conveyance to the United States of 161,000 acres of tribal land on the reservation, within the Riverton project. Legislation was enacted to approve the conveyance of the land to the United States and to authorize payment of about \$1,000,000 to the tribes.

### *Mineral Leasing*

The income received by Indians from oil and gas and other minerals in fiscal 1954 reached an all-time high of over \$34,000,000. This is about \$9,000,000 or 36 percent greater than the amount reported for fiscal 1953. Of the 1954 total, \$19,000,000 was received from bonuses, \$3,000,000 was from rentals, and the remainder of about \$12,000,000 was received from royalties.

At the close of 1954 period 4,225,490 acres of Indian land were held under oil and gas leases. About 84,000 acres were held under other mineral leases and mining permits.

During the year there was steadily increasing interest in oil and gas leasing of Indian lands in the Dakota-Montana area. The discovery well brought in on the Fort Berthold Reservation in North Dakota was a significant development on that reservation and a total bonus of \$2,853,393 was paid for leases there compared with \$556,210 for fiscal 1953. Activity continued strong on the Fort Peck Reservation, Mont., where bonus income in 1954 was \$2,728,223. There was also a revival of activity on the Blackfeet Reservation, Mont. At the close of the fiscal year bonus bids received amounted to \$1,273,250. On the Navajo Reservation a total bonus of \$4,583,733 was paid for oil and gas leases



compared with \$4,981,974 in 1953 and \$1,334,934 for the fiscal year 1952.

Rentals on existing leases during 1954 were \$3,228,000 as compared with rentals in 1953 of \$2,073,000. Oil, gas and other mineral leases are being made on reservations in 14 States west of the Mississippi River. The Osage Reservation in Oklahoma took first place in royalty payments with a total of \$5,326,054. The Wind River Reservation in Wyoming was next with the royalty income of \$1,854,400. The total royalty in the entire State of Oklahoma from production on Indian lands was in excess of \$8,335,000.

The total income received from leases other than oil and gas amounted to approximately \$1,000,000. This came principally from royalties on asbestos, coal, sand and gravel, phosphate, lead and zinc, vanadium and uranium mining leases.

## SOIL CONSERVATION

More soil conservation work was accomplished in 1954 than in any year since the inception of the program in 1940. During the first 13 years less than 1 percent of the total job was performed per year; in 1952 2 percent was performed; and in 1954 nearly 3 percent was accomplished.

The extent and effectiveness of cooperation with soil conservation districts also increased during the year. Nearly 2,000,000 more acres of Indian land were placed under formal agreement with the districts through 28 written agreements of which 13 were modifications providing for inclusion of additional Indian acreage and 15 were new agreements bringing Indian land into the particular districts for the first time. At the close of the year an aggregate area of 17,523,198 acres, comprising 31.63 percent of all Indian lands, was covered by formal agreement with soil conservation districts.

The soil and moisture cooperators contributed over 13 million dollars to the total program by their labor, materials, and money, and thus put into the effort more than \$5 for every dollar appropriated. On 15 reservations on which studies have been continuing for several years farm land under conservation operations increased agricultural production 37 percent and returned to the cooperator over \$3.50 for every dollar invested.

## MANAGEMENT OF FOREST, RANGE, AND WILDLIFE RESOURCES

Nearly 700 million board feet of timber with a stumpage value of \$9,500,000 was harvested in the calendar year 1953 from the Indian forests. About 567 million board feet of this with a stumpage value

of roughly \$9,250,000 was cut under contract or was used at tribal sawmills. The greatest concentration of timber sale activity during the year was in the Pacific Northwest and California, where 75 percent of both the volume and value of contract cutting was concentrated. About 13 percent of the contract cutting was on Indian forests in the Southwestern States, and the remainder was equally divided between the Lake States and the State of Montana.

Some progress was made during the year toward obtaining adequate forest inventories and the revision of forest management plans. This work has been completed on the Navajo Reservation, using the best modern techniques of aerial surveys supplemented by ground measurements. Similar inventories are in process on the San Carlos Reservation in Arizona and the Hoopa Valley and Tule River Reservations in California. All of these surveys are being paid for by the tribes, out of their own funds, and it is hoped that similar arrangements can be made with other tribes at other reservations.

The possible value of such inventories is revealed in the case of the Navajo Reservation. During the past ten years logging operations by the Navajo tribal sawmill have been held to a cut of about 13 million board feet a year because the data then available indicated that this was the maximum allowable cut under sustained yield management. The new inventory, recently completed, reveals that the allowable annual cut can safely be increased to 28 million board feet annually, and plans for expansion of the harvest are now being made. It does not follow that new surveys will indicate corresponding increases in allowable cut at all reservations, but it is obvious that more accurate information is needed in many instances.

### *Forest Protection*

Nearly 50 million acres of Indian and Government-owned lands continued to receive protection from fire during the calendar year 1953. Of the 1,085 fires suppressed during the year, 644 or 60 percent were caused by lightning. Two reservations were outstanding from the standpoint of fire occurrence, with 277 fires on the Fort Apache Reservation in Arizona, and 182 fires on the Colville Reservation in Washington.

Protection of Indian Forests from disease continued to be a very serious problem. Control efforts were applied to the white pine blister rust infestation in the Lake States, and to a mistletoe infestation on the Mescalero Reservation in New Mexico. Control measures are made possible through cooperative arrangement and transfer of funds from the Department of Agriculture.

### *Range Management*

During the year the Indians used about 33,400,000 acres of their range lands for grazing their livestock. The remaining 10,600,000 acres of range land was used by non-Indians under cash permits. Of the \$2,700,000 cash receipts from the sale of grazing privileges, about \$2,370,000 was collected in the States of North Dakota, South Dakota and Montana. Of the \$3,800,000 value of free grazing by Indians, \$1,720,000 originated on the Navajo Reservation in Arizona, Utah, and New Mexico. The importance of the livestock industry to the Indians, and the values of the watersheds involved, make the conservative use of these forage and soil resources of great importance. In general, the forage has been utilized in accordance with the principles of conservation. In the Southwest, however, the drought and heavy grazing pressures by the Indians in past years are continuing and this results in major problems in range management. Of particular importance in this respect are the Indian lands under the jurisdiction of the Navajo, United Pueblos, Fort Apache, and San Carlos Agencies.

### *Fish and Wildlife Management*

In some areas fish and wildlife resources are of considerable importance to the economy of the Indians. A commercial fishery is operated by the Red Lake Indians in Minnesota and there is also commercial fishing by the Indians along the Columbia River and in the coastal waters of Washington, as well as Alaska. The total income or value of wildlife resources used in the continental United States during the calendar year 1953 is estimated to be about \$2,600,000. In Alaska the commercial fishing operations during the same period were \$177,069 in wages for native hire and \$714,188.48 in income from the sale of fish.



*Operating statement and comparison of forest and range management activities  
over the past 3 years*

CALENDAR YEARS

	1951	1952	1953
<b>TIMBER SALES</b>			
Total volume of timber cut—1,000 feet board measure (includes timber cut under permit and free use).....	719, 076	668, 554	696, 189
Total value of timber cut.....	\$7, 720, 989	\$8, 366, 531	\$9, 567, 608
Volume of timber cut under contract—1,000 feet board measure.....	586, 633	542, 701	567, 249
Value of timber cut under contract.....	\$7, 387, 827	\$8, 052, 343	\$9, 239, 141
<b>FIRE SUPPRESSION</b>			
Total number of fires.....	931	1, 025	1, 080
Area burned in acres.....	52, 076	74, 508	52, 618
Damage.....	\$274, 523	\$381, 137	\$156, 125
Cost of suppression.....	\$322, 882	\$127, 590	\$174, 412
<b>RANGE MANAGEMENT</b>			
Number of cattle grazed.....	650, 029	624, 848	623, 760
Number of horses grazed.....	94, 039	92, 885	86, 691
Number of sheep and goats grazed.....	884, 782	969, 679	992, 973
Cash income from grazing privileges.....	\$2, 238, 499	\$2, 526, 853	\$2, 702, 350
Value of free grazing.....	\$3, 478, 478	\$3, 923, 816	\$3, 801, 208
<b>FISH AND WILDLIFE</b>			
Value of fish and wildlife harvest.....	\$3, 097, 824	\$2, 969, 556	\$2, 696, 400
Total cash income collected.....	\$9, 626, 326	\$10, 579, 196	\$11, 941, 491
Total value other income including free use.....	\$6, 909, 464	\$7, 207, 560	\$6, 826, 075
Total of value and receipts.....	\$16, 535, 790	\$17, 786, 756	\$18, 767, 566

FISCAL YEARS

Obligations from gratuity funds for forest and range management and fire suppression.....	\$1, 525, 756	\$1, 851, 829	\$2, 161, 507
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## EXTENSION

Under the jurisdiction of 10 area offices with general assistance from the central office, extension programs in 1953 were provided by a staff technically trained in agriculture and home economics for 38 Indian agencies. Extension personnel made 54,879 farm and home visits, held 3,519 meetings with an attendance of 95,699, conducted 2,096 demonstrations with an attendance of 20,681 people, and participated in 365 educational tours for 3,225 individuals.

### *Economic Situation*

In 1930, the beginning of organized extension work with Indians, the gross agricultural income was approximately \$1,300,000. During the peak income year of 1951, it reached \$54 million, but due to the slump in agricultural prices, declined again to approximately \$30 million in 1953.

Increased prices and the great demand for agricultural products during the past decade or so, undoubtedly account for much of the Indians' awakened interest in agriculture as well as their greatly

increased income, but their adoption of improved practices advocated by extension workers has played no small part in bringing about this economic improvement and has enabled Indians to produce commodities which have found a ready market at good prices.

### *Home Extension Activities*

In the 1954 fiscal year there were 17 Bureau field home extension agents in Oklahoma, New Mexico, Colorado, Arizona, and Mississippi with 1 field supervisor located in Washington, D. C. One-third of the home agents' time is devoted to 4-H Club work.

Assistance was given in constructing or remodeling 485 homes; in obtaining water systems for 259 families and electricity for 338; in selection and use of electrical equipment for 618; in providing proper waste disposal for 172; in providing adequate household furnishings for 872 and adequate storage facilities for 405.

During the year, 295 organized groups having 8,601 members met regularly for scheduled programs, while 181 groups met for special-interest activities. Assistance was provided 2,198 families in planning adequate food budgets; 3,991 families in food preservation and preparation; and 763 families in child feeding. Aid in clothing care, construction, and renovation was given to 4,987 families.

### 4-H Club Work

During 1953 extension personnel sponsored 590 4-H Clubs with a membership of 6,726 boys and girls enrolled in 9,529 projects having an estimated value of \$128,437. Staff efforts were directed toward the training of local leaders, establishing a thorough understanding of the program, coordinating activities with county, State, and national policies and maintaining a high standard of work and completions.

A marked increase in the participation of Indian youths in fairs, tours, camps, and county and State contests was evident in 1953. Bureau extension workers reported 853 Indian boys and girls winning county events and 122 winners in State events.

## IRRIGATION

Crops produced on 542,000 acres of irrigated Indian land in the calendar year 1953 were valued at \$44,081,000. Drought conditions in the Southwest, and particularly in Arizona, over the past several years have necessitated the curtailing of farming operations because of the limited water supplies and these acreage reductions have tended to offset the increases in irrigated farming on Indian lands in other sections of the country.

Approximately 19,800 additional acres were placed under constructed works during the year. This involved the construction and extension of canals and laterals; construction of drainage systems; construction, replacement and rehabilitation of structures; land subjugation; and the drilling, rehabilitation and equipping of wells for the purpose of supplying additional water for irrigation purposes. In addition to this irrigation development work, 122 miles of power transmission and distribution lines were extended, replaced and enlarged to greater capacities to provide electrical service to 357 additional customers on and adjacent to the Colorado River, Flathead, and San Carlos irrigation project.

The more important Indian irrigation development work during the year was on the following projects:

*Colorado River project, Arizona.*—The work on this project involved the complete development of 2,120 acres of new lands, making a total of 35,900 acres under constructed irrigation facilities as of June 30, 1954. The overall development program on the Colorado River Reservation is the expansion of the irrigation project to its ultimate area of 100,000 acres of which 75,000 acres on the southern portion of the reservation is to be developed for use by Navajo and Hopi and other Colorado River Basin Indians to compensate for the lack of economic opportunity on their native reservations. No new Navajo or Hopi colonists were settled on the project during the year. However, those colonists already on the project who were assigned an additional 40 acres late in fiscal year 1953, moved to their new locations during the fiscal year.

During the calendar year 1953, the project produced crops valued at \$3,916,871 on 33,777 acres.

*Blackfeet project, Montana.*—The work on this project consisted of the enlargement of the main canal and distribution system to provide for the delivery of a firm water supply to 17,000 acres. The supply was formerly limited to 14,000 acres in any one season.

*Wapato project, Washington.*—The work on this project was the completion of Satus unit No. 3, which provided irrigation water for an additional 1,200 acres under Satus No. 2 and 10,000 acres under Satus No. 3. This work directly benefited 218 Indian families.

During the calendar year 1953 crops produced on all units of the Wapato project were valued at \$17,887,847.

*San Carlos project, Gila River Indian Reservation, Ariz.*—The extreme drought conditions experienced on this project in 1953 continued into the 1954 irrigation season. The maximum storage in the San Carlos Reservoir was less than 20,000 acre-feet in 1953 and less than 40,000 acre-feet in the spring of 1954. The work on this project consisted almost entirely of the rehabilitation and deepening of wells and the repair and replacement of pumps.



During the calendar year 1953 crops produced on 41,032 acres were valued at \$6,380,995.

### *Survey Work*

Surveys, investigations, and field studies were continued on various projects in order to provide additional engineering data for feasibility reports and the continuing of proper and adequate construction programs on existing projects. Work on the proposed Shiprock unit of the Navajo projects, which is the largest and principal potential development on the Navajo Reservation, involved the continuation and acceleration of the collection and preparation of data required to prepare a feasibility report for the purpose of seeking congressional authorization for construction of the project. The completion of a factual engineering feasibility report is expected by June 1955. Extensive surveys were also conducted on the Yakima Indian Reservation to determine irrigable area and cost of development, together with benefits to be derived from irrigation and flood control on Satus Creek. Surveys were also conducted for the proposed White Swan project on the Yakima Reservation. Ground-water studies are being conducted at Chiu Chui and San Xavier in Arizona and Ute Mountain in Colorado.

In addition to the usual and regular preliminary and preconstruction surveys, extensive field examinations and studies and the collection, preparation and assembling of data for protection of Indian water rights were continued during the year for use in connection with the water suits entitled *Arizona v. California* and *Texas v. New Mexico*.

### ROADS

Road construction work was performed on reservations in 24 States with major emphasis on the Navajo and Hopi Reservations where \$1,330,000 was allocated for this type of activity. The bulk of the work was carried on at reservations west of the Mississippi, but substantial projects were also completed in Florida, Mississippi, Wisconsin, and Michigan.

Three hundred and fifteen miles of road were graded and drained; 352 miles were surfaced, 72 of which were blacktopped and the remaining 280 miles surfaced with gravel; 2,020 running feet of bridges were constructed, most of which were short timber trestle spans over creeks or small streams. There were several large bridges of concrete and steel construction.

Of the 315 miles graded, the county governments agreed to take over 240 miles and maintain them. They also agreed to take over 247

miles of the 352 miles surfaced. This relieves the Federal Government of future maintenance expense on these roads.

The road maintenance program covered over 19,000 miles of road. It included surface maintenance, snow removal, flood damage repair, and repairs to bridges.

## CREDIT ACTIVITIES

Since Indians are being encouraged to seek credit assistance from the same institutions that serve other citizens, loans made through the Bureau are playing a constantly decreasing role in the amount of credit they receive. During the 1953 fiscal year, advances by the United States totaled \$1,075,754, a decrease of \$1,388,081 from the \$2,463,835 advanced during 1952. During the calendar year 1953, incomplete reports show that Indians received financing totaling \$27,665,135 from non-Bureau sources, an increase of \$5,349,284 over the \$22,315,851 received during 1952.

Indians may now use their chief asset, trust or restricted land, as security for loans, with the approval of an authorized representative of the Secretary. This authority should open new channels of credit to them and permit them to utilize their main asset to secure justified financing, on much the same basis as any other citizen uses his assets. This privilege was long denied them.

### *Revolving Credit Fund*

Through June 30, 1953, appropriations for the fund totaled \$13,799,600, of which \$12,550,768 was available for loans. As repayments of principal and interest are made, they are credited to the fund and are available for further loans. This revolving feature enabled the United States to lend a total of \$22,660,748 through June 30, 1953. Of this amount, payments totaling \$13,130,362 were due, of which \$12,464,169 was paid. Additional payments of \$53,591 were in transit, extension of repayment terms were granted on \$137,487, cancellations had been affected on \$5,583, and payments totaling \$469,532 were delinquent. The repayment record in percentages for the last 2 fiscal years follows:

	1952	1953
Percent of amount due:		
Paid or in transit.....	89.78	95.32
Extended.....	8.17	1.06
Canceled.....	.04	.04
Delinquent.....	2.01	3.58

The cash balance in the funds as of June 30, 1953, was \$4,014,821. Loans receivable totaled \$10,190,941. A reserve for losses of \$482,424 has been established.

The collectibility of some of the outstanding loans is questionable. A particularly serious situation faces the Bureau on loans made in southeast Alaska. Loans were made to four Indian villages for the acquisition and operation of salmon canneries. Fishing seasons in the areas where these canneries are located have not been favorable for several years. All four of these canneries have operated at a loss for the past 2 years. About 38 percent of the total loans receivable were owing to the United States in southeast Alaska, and the poor fishing seasons have placed these loans in jeopardy.

The cash balance as of June 30, 1953, includes interest payments of \$743,828 and \$916,329 received from livestock sales and settlements under authorization contained in the act of May 24, 1950 (25 U. S. C. 443). This enactment was concerned with drought purchases of livestock made mainly by the Department of Agriculture, beginning in 1934, to afford relief to stricken growers. The animals were loaned to Indians on a repayment-in-kind basis. Under the 1950 enactment this program is now being converted to a cash basis because it is believed that continuance of a credit program peculiar to the Indians will not give them needed training in customary business practices and procedures. As of June 30, 1953, the amount of Indian indebtedness in terms of cattle had been reduced from 42,551 head to 33,353.

### *Tribal Funds*

Tribes with funds of their own available either conduct credit operations entirely with such funds or use the money to supplement funds borrowed from the United States. As of June 30, 1953, tribes were using \$9,704,611 of their own funds for this purpose. Thus, on the whole, there was about 95 cents of tribal money being used for credit purposes for every dollar which had been borrowed from the United States.

### *Use of Funds by Indian Organizations*

Repayments on loans and interest collected by Indian tribal organizations are credited to the credit fund of the particular organization and are available for further loans by the organizations within the terms of their loan agreements with the United States. Because of this revolving feature, with the \$22,660,748 borrowed from the United States and the \$9,704,611 of tribal funds, Indian organizations had made use of a total of \$45,500,457. The types of loans and the unpaid balances were as follows:



	Enterprises	Cooperatives	Individuals	Total
Total loaned.....	\$16, 183, 415	\$1, 344, 813	\$27, 477, 229	\$45, 005, 457
Total repaid.....	7, 145, 692	1, 181, 263	18, 449, 634	26, 776, 589
Total canceled.....	11, 401	13, 576	166, 375	191, 352
Balance unpaid.....	9, 026, 322	149, 974	8, 861, 220	18, 037, 516

The enterprises financed are operated for the benefit of all members of the tribe and include salmon canneries, tourist courts, stores, tribal farms, tribal livestock herds and various other types of activities. Cooperative associations are operated by only a part of the membership of a particular tribe.

The repayment record on loans to individuals suffered during the year due to drought in some areas, lower livestock prices, and poor fishing season. The following shows comparative figures for the past 2 years:

	1952	1953
Percent of amount due:		
Paid.....	92.82	92.11
Extended.....	1.68	1.86
Charged off.....	.48	.83
Delinquent.....	5.02	5.20

Fullblood Indians received over 57 percent of the number of loans made during 1953 and about 50 percent of the total amount loaned. Indians of half degree of blood or over but less than fullblood received nearly 30 percent of the number of loans made and about 27 percent of the amount loaned. Indians of less than halfblood received about 13 percent of the number of loans and about 23 percent of the amount loaned.

## ARTS AND CRAFTS

The Indian Arts and Crafts Board continued to provide technical assistance in production and marketing to 18 organized Indian crafts groups and to many individual Indian artists and craftsmen and sponsored their products throughout the Nation by a variety of methods.

During the year the Board cooperated with various crafts groups and museums in sponsoring exhibitions and sales of Indian crafts and paintings, participated with organizations in public addresses, displays, television shows, and published four numbers of a circular for craftsmen. In addition, the Board circulated brochures and pamphlets and supplied other pertinent details to individuals and groups requesting sources for information about Indian crafts.

The production and sale of Indian and Eskimo crafts in Alaska have proved to be an important factor contributing to the economic well-

being of the native population. The development of native crafts, which include skin sewing, carved ivories, jade jewelry, masks and totem poles, has been fostered by the Alaska Native Arts and Crafts Clearing House in Juneau, the Nome Skin Sewers Cooperative Association, many isolated trading posts located throughout the territory and the retail shops in various larger urban communities. To insure this development, the Indian Arts and Crafts Board has a production specialist assigned to this area who works closely with these groups and with the Bureau of Indian Affairs. Sales during 1953 made by the Clearing House and the Nome Skin Sewers alone, the only two organizations reporting directly to the Indian Arts and Crafts Board, amounted to \$173,000.

The Indian Arts and Crafts Board has within the past 2 years inaugurated the development of a jade project for Eskimos with a view to supplementing income, to providing sustained employment, and to making use of a valuable natural resource belonging to the natives. Beginning at Shungnak with \$300 borrowed capital, the Indian Arts and Crafts Board's production specialist established a small craft industry in jewelry, metal craft, and jade cutting. Last year sales from this project mounted to \$2,000. Similar projects have since been organized at Kotzebue and Noorvik.

### *Sales*

Sales of Indian crafts from the 18 crafts centers for the calendar year 1953 amounted to over \$400,000. It is significant to note that while this amount does not equal the sales enjoyed by the crafts centers during the previous year, due primarily to a loss occurring in Alaska as a result of the significant reduction of armed services personnel in the area, the majority of the Indian crafts groups showed a steady increase in sales during 1953.

The sale of Indian crafts through the 18 crafts centers advised by the Indian Arts and Crafts Board amounts to only a part of the craft sales made directly by Indians or through dealers to the American public. Estimates from Indian agencies, traders, and retail shops indicate that several million dollars worth of crafts are sold annually. For example, at Cherokee, N. C., while over \$35,000 worth of crafts were sold through the Qualla Arts and Crafts Cooperative, nearly \$90,000 worth of Cherokee crafts were sold by the many local sales shops in the immediate area.

## PROPERTY AND SUPPLY

It is the policy of the Bureau to discontinue any government operation under its jurisdiction that might compete with private or com-

mercial enterprise. Progress was made in fiscal 1954 in closing dairies, laundries, garages and other Government-operated facilities that could be duplicated by commercial sources equally as well and at less cost to the Government. The Bureau will continue to withdraw from the business of telephone and electrical distribution systems, heat and power plants, and business enterprises of like kind wherever feasible.

The Bureau, in acquiring the necessary tools and supplies, is concentrating also on disposal of all unnecessary property on hand. The automotive fleet, for example, is gradually being reduced in number and the remainder being upgraded by exchange and disposal of the less serviceable vehicles. The Bureau's overall inventory of real and personal property is being reduced wherever possible.

## PERSONNEL

The Bureau continued in 1954 to strengthen all phases of its personnel management program. Aggressive action was taken to reevaluate all positions throughout the Bureau as a basis for establishing and operating an effective and economical organization through the proper definition of job responsibilities and to provide an equitable system for fixing and adjusting the rates of basic compensation of individual employees. To assure highest possible competence, efficiency and morale among employees, the Bureau continued to accentuate supervisor-employee relationships, looking toward maximum development and utilization of their skills. In this connection career development was encouraged through active participation by supervisors and employees in an intensive Bureau-wide inservice promotion program. The Bureau actively engaged in an extensive, nationwide recruitment program for teachers in connections with the special Navajo emergency program. Qualifications standards for certain technical Bureau positions were developed. Continued emphasis was placed on supervisory and junior management training programs. Recruitment in shortage categories—doctors, nurses and teachers—was facilitated throughout the Bureau by establishment and operation of boards of civil-service examiners. Considerable study was given to the problem of Indian preference when functional responsibilities of the Bureau are transferred to other agencies of the Government such as the Public Health Service.

## BUDGET AND FINANCE

Good progress was made during 1954 in refining and improving the new accounting system installed in Bureau accounting offices the preceding year. The budget procedures are being integrated with the



system so that information supplied from the accounts will be susceptible of use for both budgeting and management purposes. Irrigation accounts were revised and simplified so as to show readily the balance due the United States at the end of any accounting period for reimbursable expenditures. Revised procedures were issued placing into effect the direct depositing procedures promulgated by the Treasury Department and the General Accounting Office. In order to facilitate Bureau operations, delegations of authority and related procedures were issued permitting the field accounting offices to approve and process various miscellaneous claims, such as claims under tribal attorney contracts, without submission to and approval by the central office. In collaboration with the General Services Administration improvements were made in the procedures incident to purchases made by the General Services Administration for the Alaska Native Service. Studies are continuing to further improve, strengthen, and simplify the accounting requirements.



# Bureau of Land Management

Edward Woozley, *Director*



**T**HE numerous functions of the Bureau of Land Management are directed by a line and staff type of organization. The multiple and complex operations of the Bureau at both the Washington and field levels serve many cross sections of the public through a program of management and disposal of public lands and its resources both renewable and nonrenewable. A survey and reorganization of the Bureau was undertaken during the past year in order to promote efficiency and economy of operation as a bureau and to better serve the public at the "grass roots level."

The revenue from the management of the public lands in fiscal year 1954 was the highest of any preceding year. It exceeded the previous year's collections by over \$10,000,000. Income from all sources for fiscal year 1954 was \$77,487,000. Of the total amount, \$27,232,000 was distributed to States and counties. The receipts were from many sources including the leasing of oil, gas, and other minerals, timber sales, and grazing leases.

Through its basic operations in cadastral engineering, range management, minerals, forestry, and lands, the Bureau of Land Management has made many major contributions to the development and use of natural resources on public lands. Under its jurisdiction are some 180 million acres of public domain in the United States and 290 million acres in Alaska. In addition, this agency is responsible for the leasing of minerals on approximately 700 million acres of federally owned lands and about 50 million acres of privately owned lands in which the United States Government has mineral rights.

Highlights of accomplishments under the Bureau of Land Management's reorganization including general administration, and a review of the work by functions embracing cadastral engineering, lands, range management, forestry, minerals, and international cooperation are given in this report.



## REORGANIZATION

*Authority.*—A survey team to study the organization and operations of the Bureau was appointed by the Secretary on December 18, 1953. Following a detailed study of the Washington office and the field, recommendations were submitted to the Secretary, and on January 26, 1954, the Director was authorized to place these recommendations into effect within 1 year, with the least possible interruption of work and service to the public.

*Organization.*—The Bureau is divided into the Director's office located in Washington and the field offices. The purpose of the Washington office is threefold, including policy formulation, planning, and executive direction of the Bureau programs. The purpose of the field organization is the execution of the Bureau's programs in accordance with the administrative policies in the most economical and efficient manner to best serve the public interests.

The Washington office was reorganized into the Director's office, his personal staff, and two divisions—one for technical activities and one for operations. The Division of Technical Programs is headed by the Associate Director assisted by the staff officers for each of the functions of lands, minerals, forestry, range management, cadastral engineering, and international cooperation. The functions of personnel administration, finance, administrative services, and land management for the closed land States are the responsibilities of the Division of Operations under the direction of the Executive Officer.

The Director's personal staff includes an assistant to the director in charge of management improvement, docket control and the reorganization procedures, an information officer, and a group of field commissioners to hear appeals for land office decisions.

The field portion of the Bureau has been changed to place service in unified areas of geographic similarity and with more concentration of field personnel at the State levels. The former seven regions have been reduced to four areas, with headquarters as follows: area 1—Portland, Oreg.; area 2—Salt Lake City, Utah; area 3—Denver, Colo., and area 4—Anchorage, Alaska. Activities in the closed land States east of the 96th meridian are being conducted through the Eastern States office in Washington, D. C. This office also handles acquired land cases, and supervises issuance of patents and most of the public land orders as well as activities in connection with the outer Continental Shelf.

A new addition to the Bureau organization is the State office. The State office is the operating office for field personnel for all programs and exercises authority over all other BLM offices in the respective States, which include the land offices, grazing district offices and district forestry offices.

The State offices are located as follows:

Spokane, Wash.	Cheyenne, Wyo.
Portland, Oreg.	Salt Lake City, Utah
Sacramento, Calif.	Denver, Colo.
Boise, Idaho	Santa Fe, N. Mex.
Reno, Nev.	Phoenix, Ariz.
Billings, Mont.	

*Progress in reorganization.*—All area and State offices have been established and key personnel have been assigned. The Washington organization has been approved.

The decentralization of the Washington office caseload work for both lands and minerals has proceeded according to schedule. Some parts of the schedule have been revised in order to assure adequate trained personnel and records in the various field offices. The Bureau has installed a pilot docket system in the Washington office for maintaining a record of cases. This system will later be installed in each of the local land offices.

*Land Records.*—The survey team recommended an immediate program to preserve, reform, and modernize the land title and use records of the Bureau. The condition of these records has been recognized for some time and considerable work has been done. Basic systems for this purpose are being investigated and tried in order to clarify the fundamentals for a modernized land record system. During the development of this records improvement program, which will require approximately 3 to 5 years under the present program to achieve material results, several interim measures in the interest of security and better placement of records are being taken.

*Budget and Finance.*—A pilot installation of a decentralized general ledger was made at Portland. Through arrangements with the Department, both the records in Washington and at Portland were maintained concurrently on two bases: accrued expenditure and an obligation basis. The results have indicated that, insofar as this Bureau is concerned, the records need be maintained only on an obligation basis and in fiscal year 1955 the procedures will revert.

*Administrative Services.*—A strong emphasis is being placed on utilization, maintenance, accurate physical inventorying of property, and the timely disposal of excess property.

### *Personnel Management*

Fruits of earlier recruitment of young professional foresters and range conservationists and others became evident during the year, as many of these men moved into more responsible positions. The success of young professionals who have been with the Bureau less than 5 years proved the wisdom of the Bureau's recruitment policy and indi-

icates the necessity of continuing it along approximately the same lines.

The Fifth Annual BLM Training Conference was held in August at the Tony Grove summer camp of the Utah State Agricultural College near Logan, Utah. Representatives of the college, Congress, the Forest Service, and other Government agencies participated in the program along with 44 selected Bureau employees.

The Bureau continued its participation in management training by selecting three experienced professionals from the field and recruiting one JMA in Washington.

Employment in the Bureau on June 30 totaled 1,748, distributed as follows: Area 1, 433; area 2, 461; area 3, 455; area 4, 149; Eastern States office, 95; Washington office 152, and technical assignments in foreign countries, 12. These figures include 34 legal employees transferred to the Solicitor's office on July 1, 1954.

Reorganization furnished an opportunity to improve placement of a number of employees. The result of the reorganization in general from the standpoint of personnel management should be greater net productivity per personal service dollar. Reshaping of the staff to conform to new or changed organization units was accomplished without the necessity of resorting to reduction-in-force procedures. This was possible because there was a position available for every person on the rolls who was qualified and willing to accept at the location where the position existed.

### *Additional Accomplishments Under Reorganization*

The reorganization and the accomplishments discussed above have been attained during the last half of the fiscal year. With the remaining time to proceed on effecting the complete reorganization, there is still much work to accomplish and many opportunities to effect additional improvements. It is felt that to date the accomplishments have been made with as little distraction and disruption as possible, and that the public has continued to receive improved service with each step achieved. Certain recommendations of the survey team require action by the Department or cooperative efforts with other agencies. These types of adjustments usually require a longer period to be completed because of the more complex situations involved.

## CADASTRAL SURVEYS

The Bureau of Land Management is the official agency for conducting the cadastral survey of the public land, including Indian reservations, national forests, etc. The survey work of the Bureau is limited by appropriation to the public lands under its jurisdiction; surveys



conducted for other Federal agencies must be on a reimbursable basis. The law permits private contributions to defray the cost of the cadastral surveys in particular instances.

In any program of land management or development it is basic that the boundaries of the lands being administered be definitely known. The Federal Government is no different in this respect than any private or corporate body seeking to improve or develop their own lands. Thus it is that the cadastral surveys of the Bureau are the first step to be taken in the conservation or development of the public lands and their resources under the jurisdiction of that Bureau. Those programs looking toward the conservation of the resources which will prove to be of such tremendous value in future years, such as timber management on a sustained-yield basis, soil and moisture conservation, range improvement, and reclamation, are dependent in large measure upon adequate cadastral surveys as a basis for their development and administration. The transfer of public lands to the several States in satisfaction of their school grants is dependent upon the cadastral survey of those lands for identification and description.

The cadastral survey program of the Bureau of Land Management during the fiscal year 1954 was planned to aid to the fullest extent the conservation and development of the natural resources. The requests for surveys which originate with the other operating functional offices of the Bureau, as well as the States and industrial organizations, are of necessity screened and evaluated in the light of funds and personnel available for the work. Priority determinations are the result of careful consideration of the value of each project in the conservation and development program of the Department as a whole, as well as the immediate use and benefits resulting from those surveys. The 1954 program was balanced to provide for such important activities as the timber salvage operations in western Oregon and California, the survey of areas of high potential or important mineral development, the survey and resurvey of areas where livestock forage will result in increasing the food supply of the Nation as well as those areas especially considered for homesites and housing of the increasing population.

### *Outer Continental Shelf*

An activity of major importance during the year was the result of the passage of the Outer Continental Shelf Lands Act on August 7, 1953. That act provides for the leasing of areas on the outer Continental Shelf for development of the mineral resources underlying the seas. Those resources are notably oil, gas, and sulfur. As the result of the passage of that act, there devolved upon the cadastral engineering organization the need for means of describing suitable areas for leasing and the definition of the boundaries of those areas. The initial

activity was confined to the outer Continental Shelf in the Gulf of Mexico offshore from the States of Louisiana and Texas. In that area approximately 400 leases had been issued by the States which might be subject to confirmation under section 6 of the act. There was considerable interest shown in the leasing of additional ocean bottom in this area for exploration and development of the oil and gas deposits with resultant increase in the known reservations.

In order to accommodate this interest and provide the base for leasing the area, the existing scheme of description, based upon coordinate values as adopted by the States of Louisiana and Texas for limited areas in comparatively shallow waters, was expanded and extended on the outer Continental Shelf to the limit of what is considered practical for development by present methods of drilling in the deep waters. Leasing maps, covering approximately 12 million acres on the outer Continental Shelf offshore from Louisiana, were completed during the year and a good start made on similar maps covering approximately 8 million acres on the outer Continental Shelf offshore from Texas. This phase of the cadastral program in itself will afford the basic data necessary for description and location of areas which are expected to produce great volumes of petroleum products for many year to come.

### *Surveys in Continental United States*

The public land statistics reflect that there are some 100 million acres of unsurveyed public domain in the 11 Western States. Considerable portions of that great unsurveyed area lie within national forests or other permanent reservations where there is no present urgent need for the surveys. On the other hand, there are very extensive unsurveyed areas, particularly in Utah, Arizona, and California, where the public-land survey net should be extended for identification of school lands, for development of mineral resources, and to provide the basic data necessary for administration and development of the lands to their full potential.

Our public-land survey program was initiated in the Western States more than a century ago. In many of the older surveys the corners were not monumented with such permanence as to withstand the ravages of the elements and the destructive forces of man's machinery. There are millions of acres of public land in these Western States, to which title is still in the Federal Government, which are in urgent need of resurvey to provide for the recovery and remonumentation of the corners and the remarking of the boundary lines for the proper development and useful conservation of the resources of those lands.

In the cadastral survey program for the year 1954 there were approximately 1,320,000 acres of land. Included in that program was the continuation of such important and essential work as identifica-

tion of lands for the development of uranium deposits; the surveys necessary for control in development of mineralized areas; and for the determination of boundaries of valuable timbered lands under the jurisdiction of this Bureau. The program of surveys for identification of school lands was expanded on a plan designed to limit the surveys to the boundaries of the townships involved and the particular school sections in those townships, all as a basis for securing title to those lands in the States involved. Additionally, the program encompassed the surveys and resurveys of lands required for determination of boundaries of public domain forest land areas, for proper management of those resources, and for the management and improvement of grazing lands to improve forage capacity. Also included in the program was the survey of approximately 17,000 acres of small tracts to provide homesites in areas of population growth in the Western States and also for vacation homesites in those States and Florida. Miscellaneous surveys and investigations involving waterfront areas to determine the ownership of the lands were carried on to completion during the year.

The program also included the resurvey of extensive areas within various reclamation projects, such as the Missouri River Basin Development and the Colorado Big Thompson project. Those surveys included many miles of reservoir boundaries and rights-of-way traverses in addition to the surveys strictly on an area basis.

### *Alaskan Surveys*

The field program carried forward in Alaska was planned to meet the most urgent demands. The program was carefully developed in the light of available funds. Less than 1 percent of the vast area of Alaska has been surveyed and it must be recognized that the expanding developments of the Territory points to the need for acceleration of the surveys.

The program for the year just ended resulted in the survey or resurvey of approximately 22,000 acres of land under the rectangular survey net, as well as the survey of 28 homesites and homesteads; two trade and manufacturing sites, and two Indian allotments. In addition, a total of 1,789 small tracts, 327 town lots, and 162 lots for the Alaska Public Sale Act were surveyed, thus making available land for that many homes and homesites in areas of the greatest development.

Protraction maps were prepared to provide a basis for lease descriptions on an extensive area of unsurveyed land in the Yakataga-Katella area. These lands are considered to be valuable for oil and gas deposits and one of the major companies was engaged in prospecting operations in the area at the close of the fiscal year.



The future development of Alaska will be aided by the extensive program of survey work completed during the year. While that program is large, it must be recognized as but a fraction of that which is needed.

## LANDS

### *New Legislation*

Legislation passed during the year will facilitate orderly disposition of public lands suitable for use by various classes of individuals and agencies. It will also obviate the need for special legislation in many individual matters which ordinarily arise year by year.

Among the more important of the new laws was the passage of a thorough-going amendment of the Recreation Act of 1926. The new law, enacted June 4, 1954, permits the Secretary to dispose of suitable lands by lease or sale to agencies and instrumentalities of Federal, State, and local governments and to nonprofit corporations and associations for use of all types of public purposes. The act also applies to public lands in Alaska, as well as in the States, and exempts very few classes of withdrawals and reservations from its terms. It is a broad-gaged tool which will permit the dedication of special-purpose lands to their appropriate use. Authority for processing action under the law will be delegated to the Bureau's local officials to permit prompt and effective realization of the objectives of the legislation.

The extension of veterans' preference by the act of June 18, 1954, confers on veterans of the Korean conflict all the rights and privileges of the Veterans' Preference Act of 1944 and extends the preferred right of applications by both World War II and Korean veterans until 1959. A basic modification of the previous practice is the requirement of cultivation of one-eighth of the lands by veterans in their homestead entries before patent for the lands can be earned. This change will be of particular importance to the development of Alaska where the former waiver of cultivation requirements had led to substantial amounts of absentee ownership and to large areas of patented but undeveloped agricultural lands. The new law favors bona fide farming attempts and discourages appropriation of lands for purposes other than agriculture. In the past, homesteading by veterans was often to the detriment of other applicants in good faith for such lands. Revision of the law will expedite land and resource disposal programs in the Territory.

The amendment of the Small Tract Act on June 6, 1954, will also lead to a more effective disposal program, particularly in Alaska. The amendment extended the act to unsurveyed lands and the O. and C.

lands, and permits the lease and sale of small tracts to corporations, associations, and governmental units as well as to individuals. Broadening of the terms of the law gives the flexibility needed in the disposal of small areas useful for residence, business, recreation, and community purposes.

A long-standing inequity in respect to school lands was ended with the signing of an act by the President on April 22, 1954, which granted the States mineralized school sections even though they were covered by an outstanding mineral lease or permit. In 1927 Congress granted the States mineralized school sections but excepted those under lease or permit at the time of survey. States' title then depended on the accidents of mineral prospecting. The remedial legislation corrects this situation by passing title to the lands to the States for use for their common school system and by transferring to the States all rights of the United States in leases or permits in force on such lands.

Improvements in the color-of-title law were made by the act of July 28, 1953, which simplified and unified the existing law. Patents may now be issued for claims of long standing, under certain prescribed conditions, without reserving minerals to the United States. Payment of taxes on the land during the period beginning prior to 1901 is now a basis for favorable action on a color-of-title claim.

### *Withdrawals and Reservations*

The Department's and Bureau's drive to revoke unnecessary withdrawals of land reserved for public purposes and to reduce and modify unnecessarily restrictive withdrawals gained momentum during the year. Revocations totalling 1,777,000 acres, of which 1,181,000 acres were in Alaska, were published. At the end of the year, several million acres were in various stages of processing for ultimate revocation.

Through the cooperative efforts of the Bureau, the Geological Survey, and the Department of the Navy, the results of years of Government sponsored oil and gas exploration and testing in northernmost Alaska were placed on open file. Plans have been well developed for opening the lands outside the Naval Petroleum Reserve in that area for development under the Mineral Leasing Act of 1920. In order to give the interested public full and equal opportunity to assess the results of the exploration to date, the information was placed on open file well in advance of the date of opening.

During the year, new procedures for proposals of new withdrawals were fully instituted. All applications for withdrawal are publicized upon receipt by the Bureau of Land Management and public hearings are held when the nature of protests as the result of publication or other circumstances warrants it. Several hearings were held during the year at which the objectives and disadvantages of proposed with-

drawals were publicly discussed. The hearings proved valuable in bringing out essential facts needing recognition in decisions in each case and permitting adjustment between national needs and local requirements.

Important modifications during the year included the opening of the Carlsbad area, New Mexico, to oil and gas leasing and the Man-tanuska Valley, Alaska, to coal leasing.

New withdrawals during the year were relatively minor in scope except for the withdrawal of 1,178,000 acres in Utah and Arizona for the Colorado River storage project. The latter lands were opened to mining location and development until needed for the reclamation project.

Efforts during the year thus resulted in freeing additional resources for development while providing at the same time for the legitimate needs of the various Federal and State action programs.

### *Applications for Land*

Receipt of applications during the year continued at an accelerated pace. New work received by the Bureau increased 50 percent over the preceding year, which in turn had set a record for recent years. Chief cause for the even higher rate of applications is the steadily mounting interest in small tracts. Applications for leases and for sales of small tracts both about doubled the previous year's intake. Applications for other types of land disposals or permitted use continued at a fairly steady pace except for desertland entry applications. Applications for this latter type of case dropped to about 50 percent under those received in the fiscal year 1953, indicating perhaps that the peak has been passed in the efforts to reclaim certain classes of desert basins by development of underground water supplies. Experience gained in the past few years and changing conditions, including increased costs of production and somewhat lower agricultural commodity prices, may be important factors in this trend. On the other hand, the joint Bureau of Land Management-Bureau of Reclamation program for revocation of unneeded reclamation withdrawals has been making available some areas for entry under the public land laws.

Work completed during the year exceeded by about 50 percent the work done in 1953. The constant acceleration of new work, however, defied all efforts to make inroads into the backlog of pending cases. This has been the experience of the Bureau each year since the beginning of the Korean conflict. Improved production was realized for most classes of cases, yielding net gains in some fields. The heavy loads in small tracts and withdrawals and reservations, however, offset the improved conditions of other phases of the work.



## *Organization and Procedures*

By the end of the fiscal year, reorganization of lands activities was close to completion. Staff and operating responsibilities were clearly separated and practically all lands operations were transferred to field operating officials. Adjudication, classification, and examination activities were centralized in State offices to permit close coordination and direction of the work and closer contact between applicants and Bureau personnel.

Staff personnel, freed from operating duties, were able to make a substantial beginning on organizing and modernizing the materials which govern operations, including policy statements, manual procedures, and regulations. Owing to the multiplicity of public land laws and the endless variety of situations which arise in individual cases, rationalized and simplified guide materials, although difficult to produce, are highly essential to efficient operations. For example, present regulations are largely the results of annual accretions over many years. Consequently, they are difficult to operate under and obscure to public land applicants. A program was started looking to the complete revision, including reorganization and simplification of the regulations dealing with land disposals, such as homesteading, exchanges, and veterans' rights and privileges.

### *Land Classification*

During the year, considerable advances were made in the Bureau's program of area land classifications. The major objective of area classification is economy in operations through the consideration of all the land-use factors affecting an entire geographical unit, usually a small sub-basin. This overall consideration permits assessment of all values and results in information which allows action on all types of applications on hand or when received. Most area classification work of the Bureau, owing to the great influx of applications, is done in response to demand for land from applicants. However, the Bureau is participating in two large interagency classification programs in the Missouri River Basin and in the Arkansas-White-Red Basin.

Land classification work in the Missouri River Basin is well advanced and is more than half completed. Several disposal areas have been delineated in which a Bureau program of land disposal on its own motion is being started. Thousands of acres, consisting largely of relatively small, scattered parcels will be placed in private or local government ownerships or under other Federal administration in the coming months. Several major land-pattern adjustment programs are underway for the simplification of administrative control of lands among Federal and State agencies. Important data for land treat-

ment measures needed in connection with water developments in the Basin are also being secured and action programs initiated.

Bureau studies in the Arkansas-White-Red River Basin involves land in eight States. Most of the land, however, is concentrated in southeastern Colorado. Information to date has disclosed that much of the land outside of Colorado is suitable for disposal. As a result, the forest classification withdrawal in Arkansas has been lifted in part, and upon completion of the classification the remainder will be revoked. An accelerated program of forest-land classification in the Eastern States has been initiated. Most of the public lands in the States east of the Mississippi cannot be managed economically by the Government and will be disposed of. Institution of a program of area sales has stepped up the disposal program and procedure. Classification will be completed as rapidly as possible to permit the Bureau to make its full contribution of information necessary for the formulation of an integrated water development program for the region.

Area classification has been a particularly useful tool in dealing with concentrations of applications in areas of fringe developments, such as isolated desert basins and suburban zones. Examples of such small-area classifications follow.

Chuckawalla Valley is a desert basin in Riverside County, California, containing about 300,000 acres. About 450 desert-land applications were filed for lands in the valley. Investigations showed that the Valley has no perennial streams and that the ground-water supply is primarily dependent upon a small percent of annual precipitation which reaches the permanent water table. Although about 64,000 acres were found suitable for cultivation after proper land treatment, the indicated water supply seems sufficient for crop production on a sustained basis only on a small portion of the total arable acreage in the undeveloped valley. Therefore, 28,000 acres were designated as best suited for development because of type of soil, slope, and low cost of land preparations.

In the Raft River area, Idaho, a study of the land capabilities in the area by the Bureau and the issuance of a report by the Geological Survey on the groundwater resources indicated additional agricultural development was feasible. Accordingly, some 10,000 acres were allowed under the desert-land act and it is expected that this land will soon be in agricultural production.

Thousands of small-tract applications have been filed in the vicinity of Las Vegas, Nev., particularly in the neighborhood of the now famous resort strip of that community. Area studies resulted in the classification of a large amount of acreage for small-tract purposes. The investigations included careful study of the groundwater supply situation which was necessitated by the fact that the Bureau must take

action not only on many small-tract applications, but also on completing applications for the same lands by applicants for desert-land entries, exchanges, and other disposals.

Studies in the Waterman Wash area, Arizona, showed that 3,500 acres were under irrigation in the valley. With a water duty of 5 acre-feet per annum, consumptive use was calculated to be in excess of the annual recharge to the groundwater reservoir by seven and one-half to eight and one-half times. Allowance of the pending 116 desert-land applications would threaten such development as exists. By contrast is the action taken in the nearby Rainbow Valley, which further exemplifies the decisions based on the merits of the area involved. A current overdraft of available water supply was found but the data obtained indicated that an allowance of a few more entries would not result in any appreciable effect on existing farms.

A total of 32,000 acres of public domain in Guadalupe County, N. Mex., was classified on an area basis. The county is located in the east central portion of the State and most of its 2 million acres are range forage lands. Examinations showed that the 334 tracts of public domain in the area could be best used and managed in non-Federal ownership and they were classified as suitable for disposal upon application. Other area classifications encompassed a variety of land-use situations calling for adequate data to be interpreted by sound judgment. In addition to these area classifications, a large number of individual cases and groups of such cases were examined and classified during the year.

## RANGE MANAGEMENT

### *Importance of the Public Lands to the Western Range Livestock Industry*

The public lands administered by the Bureau of Land Management generally are more suited for grazing purposes than any other surface use. They contribute in a major degree to the total forage requirements of the western range livestock industry. Consequently, the continued welfare of this industry is dependent upon the balanced and complex integration of land use involving the total area of the range and all classes of land ownership. Within the range country there are limited irrigated areas devoted to specialty crop production, but the backbone of the agricultural economy over extensive areas is the livestock industry. Supplemental forage produced on irrigated land depends on water supplies from high mountain watersheds. These same watersheds produce valuable livestock forage for summer use but do not yield sufficient water to produce the remainder of the annual forage requirement of the livestock on the cultivated lands lying be-



low. The great significance of the public lands administered by the Bureau is due in part to their watershed values but most significantly they provide spring, fall, and some winter grazing and thereby round out the annual forage requirement of dependent livestock operations.

During the past year permits and licenses were issued to approximately 19,100 stockmen, authorizing their use of the Federal range within the 59 established grazing districts. These authorizations allowed the grazing of 8.8 million head of livestock for about 35 percent of their annual forage requirement. Included were 2.5 million cattle, 59,000 horses, 6.3 million sheep, and 15,000 goats. Outside of grazing districts 17.9 million acres were under grazing lease to 9,800 stockmen.

### *Range Administration Program Intensified*

The grazing administration function of the Bureau is accomplished by a limited staff involving a total of 245 technicians and clerks. Due to the reorganization of the Bureau, the nature of the duties and functions carried out at the grazing district level have been sharply defined and made more practical in scope. Full attention has been placed upon range privilege adjudication activities, range development and conservation work, range condition and trend studies, and range-use supervision.

The top priority activity for the past year has been the adjustment of grazing obligations on the Federal range to the available and proper grazing capacity. This activity has been carried out through the reappraisal of range privilege adjudications and stocking of the range with the consequent elimination of unqualified demands and improper management practices. The reappraisal includes rechecking dependent property surveys and resource surveys by permanent and seasonal employees, but was restricted by appropriation limitations. Coincident with the adjustment of obligated use to grazing capacity is the formal reservation of forage for big game animals, made in accordance with the availability of forage and the suitability of areas as wildlife habitat in order to arrive at a proper domestic livestock-wildlife balance.

The range administration activities are directed toward having over 90 percent of all range users under term permits. This goal cannot be reached in 1 year, but can be attained in a few years barring unforeseen difficulties.

Supplemental to this activity and of high priority has been the initiation of range condition and trend studies to acquire accurate information with which to justify administrative actions. Lack of information of this nature has been one of the principal weaknesses of

the Bureau's range administration in the past. An increasing participation in the studies of range users is anticipated.

With the staffing of grazing districts at the prescribed level, range-use supervision has been better and more intensive than at any time since the Federal range was brought under regulation. The activity in this connection has been to make range-use inspections according to regularly scheduled plans during the appropriate season to cover critical administrative units.

The effort to lease all section 15 lands in retention areas has continued. Through consolidation of leases held by operators having more than one lease, considerable duplication of record keeping and administrative actions, and confusion to lessees is being eliminated. Transfers in administrative headquarters have brought about more adequate administration and ease in supervisory activities.

### *Range Conditions*

The drouth conditions of a year ago in large portions of the Southwest have continued with little abatement. Supplemental feeding under the emergency drouth relief program was carried out generally during the past year over the drouth area. In southern Wyoming, most of Colorado, and much of New Mexico and Arizona feed conditions were poorer than the peak of the drouth cycle in 1934. The lower ranges of Nevada and Utah have had very scant forage, and supplemental feeding of livestock during the coming fall will be a necessity in many areas. Prospects for the coming winter season are equally poor in the drouth areas, since a mild winter and dry, cold spring curbed normal forage production. Voluntary stocking adjustments and widespread supplemental feeding is anticipated.

Northern ranges in the western public land States are in normal or near-normal condition due to late spring rains. Some localized areas did not benefit from these rains and forage production is materially below average.

### *Wildlife Management*

*Sheeptight fences.*—In recent years a wildlife management problem has developed in Montana and Wyoming resulting from the construction of sheeptight fences on public ranges that are utilized by antelope. These fences have been constructed as a better pasture management device and to reduce the necessity for so many herders. A more effective predator control has lessened the hazard of sheep running loose in pastures without the constant protection of a herder. However, local and national wildlife groups have been seriously concerned about

the fences because of the belief that they denied antelope access to their more favored seasonal ranges when the fences crossed migration routes or enclosed water supplies.

The Bureau of Land Management and the Fish and Wildlife Service the past year completed a joint study of this sheeptight fence problem as it relates to the welfare and management of antelope on the public domain in Montana and Wyoming. The study provided the information needed for the development of suitable fencing on areas of public domain to meet the requirements of the livestock interests and at the same time protect the public interest represented in the antelope and other wildlife resources. Specifications on fencing, such as openings or drop gaps, height of wires, and the suitability of woven wire in certain places are now being developed and will serve as general criteria for fence construction. Local problems may require special consideration in regard to fencing specifications.

*Determination of Grazing Capacity for Game Animals.*—The cooperative range resource survey of the Fort Peck game range in Montana has been completed recently by the Fish and Wildlife Service and the Bureau of Land Management. A method was devised and used for rating this range for both livestock and big game separately, and for dual use where the range was subject to complete use by game and livestock.

The value of this approach lies chiefly in that a reasonably accurate determination of excess grazing capacity available only for game can be determined and made a part of the management plan. Secondly, forage reservations for either livestock or game can be made on a realistic basis and a conversion from one class of use to another can be made on the basis of what a particular forage type will produce in the way of either livestock or game feed. This new method of forage resource surveys is considered one of the outstanding land-management developments in recent years and will serve as the basis for attaining proper livestock-wildlife balance on problem areas in the future.

### *Soil and Moisture Conservation*

Progress was made during the year in the revised programming of this activity by watersheds. A large number of approved soil and moisture conservation areas were consolidated into subbasins of major western rivers, extending the area covered by the program to all Bureau lands within the watershed. Long-range conservation plans projected over a 20-year period in line with the Department's overall conservation program are under development for all subbasins.

An increase in appropriations permitted the concentration of project funds for complete watershed protection in individual water-



sheds or segments thereof. This approach results in a more effective program and a more efficient use of funds. Outstanding examples of accomplishment in watershed protection during the past year include Railroad Wash in eastern Arizona and tributaries of Willow Creek in northern Montana. The total area of Bureau lands receiving conservation practices during the fiscal year exceeded 650,000 acres.

The Bureau's achievements in conserving soil and water through the practice of range waterspreading attracted international attention last fall. (See figure 1.) Under the sponsorship of the Foreign Operations Administration, the Bureau, assisted by other agencies, conducted a 90-day training tour of waterspreading and other range conservation projects in the west for a group of leaders from Middle East countries. In this connection Bureau technicians collaborated with other Federal agencies in the preparation of a technical manual on waterspreading for use in training foreign technicians in this practice.

Bureau technicians also won the approbation of the Corps of Engineers for watershed protection work in the Southwest as an effective aid to downstream flood control.

The program of pilot soil conservation districts in public land States developed in cooperation with the National Association of Soil

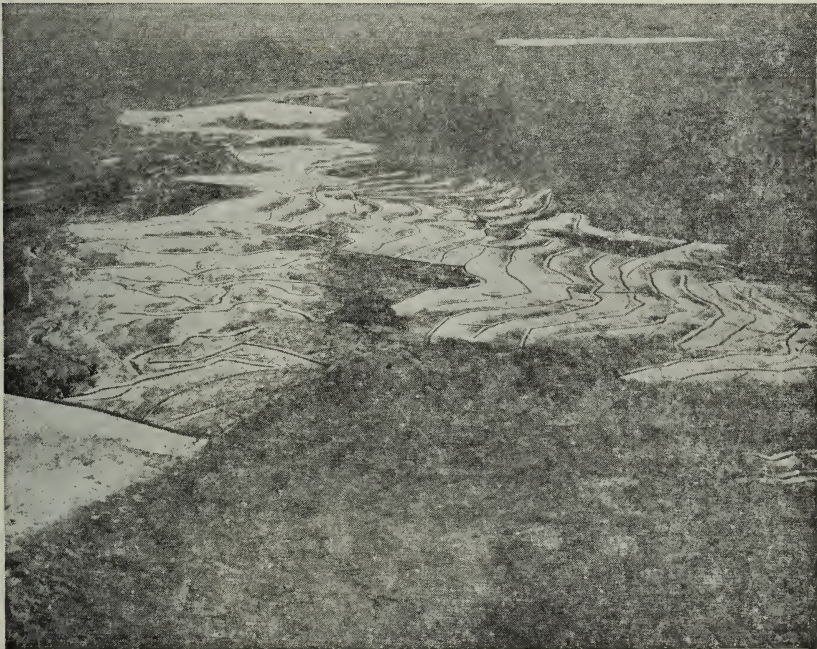


FIGURE 1.—Range waterspreading project on a tributary of Willow Creek in northern Montana. This project has been constructed at the confluence of two minor streams and is shown in full flood stage.

Conservation District Supervisors moved ahead with integrated conservation plans now completed for 11 pilot districts. The rancher-supervisors of the Northeast Elko pilot district in Nevada took sufficient pride in the accomplishments in their district to produce a color-sound motion picture of conservation progress. The picture, which generously commends Bureau cooperation, has been released for nationwide showing through 2,500 local soil conservation districts.

### *Halogeton Control*

Surveys of the poisonous range weed, halogeton, have revealed the area of infested Bureau land to exceed 4 million acres, an increase of almost three times the area previously reported. Most of the increase has resulted from an intensification of sparse infestations and a coalescence of scattered areas. Invasion of new range areas has been slight and has been held in check by control work.

Continued emphasis in control operations was placed on the seeding of infested and threatened ranges to hardy perennial grasses. Approximately 125,000 acres of rangeland were seeded in fiscal year 1954 bringing the total area seeded since the program was started in 1952 to about 325,000 acres. An additional 25,000 acres have been prepared for fall seeding in 1954. An unusually high degree of success has been obtained thus far in the seeding program despite generally unfavorable climatic conditions. (See figure 2.) For the most part, the success can be attributed to good seedbed preparation and careful seeding methods aided by timely though scant precipitation.

Successful seedings in all cases are eliminating halogeton or reducing the volume present below critical amounts. As the grass becomes better established with maturity, it is anticipated that halogeton can be excluded altogether and reinvasion prevented excepting in stand openings caused by soil deficiencies or other factors. Some of the earliest halogeton control seedings will be ready for grazing use in the fall of 1954 and spring of 1955 thereby relieving use on surrounding rangeland unsuited for reseeding. The full influence of the reseeded ranges on the halogeton problem will probably not be known for several years. In the meantime, the Bureau has undertaken a systematic evaluation of the control methods now used with the assistance of specialists from other agencies. The principal objective of the evaluation is the improvement of present methods as means of developing more effective control programs. The use of chemical sprays in the control of halogeton was confined to infestations bordering major transportation routes and isolated spot infestations. Most of the chemical work was carried out in cooperation with State and county weed-control agencies.





FIGURE 2.—The LaMoille reseeded range pasture near Elko, Nev., has been under managed use for several years. It is representative of hundreds of thousands acres of depleted rangeland that have been reseeded in recent years.

Of special importance to the halogeton control program is the development of basic information on the life history of the plant and methods for its control by research agencies. The Bureau has been participating in and supporting a coordinated halogeton research program with the United States Department of Agriculture and several land grant colleges. The investigations now underway are beginning to yield vital facts on a hitherto little known plant that are essential to an effective control program.

### *Range Improvements*

The continued severe drouth affecting much of the range country has resulted in a departure from range improvement plans in order to meet local emergency conditions. Water development has received prime emphasis in the drouth areas with other planned improvements deferred until some future date. Elsewhere the construction of division and allotment boundary fences received the major emphasis. Fencing under all range programs is now proceeding at a rate of about 750 miles each year resulting in better management of the range and better control of trespass livestock.



As usual during periods of drouth, insect pests have reach serious outbreak proportions in some areas. Effective control measures during the 1953 season reduced Mormon cricket infestations to an almost harmless level. On the other hand, there was a rapid buildup of grasshopper infestations reaching a total of almost 900,000 acres of Bureau lands. A cooperative control program has been organized under the leadership of the United States Department of Agriculture in which the Bureau and range users have participated.

### *Legislative Highlights*

Major legislation enacted by the 83d Congress affecting range management functions is as follows:

*Public Law 375.*—Amended the Taylor Grazing Act by authorizing the Secretary of the Interior to grant an appropriate preference right to range users, on lands restored from withdrawal, for a grazing lease, license, or permit when these livestock men have used the lands immediately prior to the time of restoration. In addition, and of major importance, the new law deleted the language of the Taylor Grazing Act which limited the area of public domain in grazing districts to 142 million acres. Lifting of the limitation will allow the addition to districts of the relatively small areas of remaining public domain suitable for incorporation into districts.

*Public Law 387.*—Amended the Recreation Act of 1926 by providing for the sale or lease of public domain up to 640 acres in any one year, to nonprofit organizations if the Secretary of the Interior agrees with the recreational purposes for which the lands are to be conveyed or leased.

*Public Law 524.*—Authorized the Department of Agriculture to cooperate with local organizations on watershed protection and improvements. The Secretary of the Interior is authorized to cooperate in these conservation programs on watersheds, public lands, or irrigation projects.

*Public Law 566.*—Provided for the transfer of surplus seed held in storage by the Commodity Credit Corporation for reseeding public lands.

Accomplishments to be expected in the coming year will center around the intensified range administration activities, programming soil and moisture conservation on a watershed basis, and a very active weed control program. Significant strides will be made toward reaching the ultimate goal of having in excess of 90 percent of all range users under term permit. Substantially complete realignment of soil and moisture on a watershed basis will be brought about. More effective halogeton control is expected through the application of results of a systematic evaluation program and research findings from the

several land grant colleges and the Department of Agriculture. It is anticipated that 700,000 acres of public range land will receive conservation treatment, including:

125,000 acres—range reseeding; 12,000 acres—waterspreading; 800 miles—range fencing; 30 major erosion control structures; 250 stock waters.

## FORESTRY

### *Timber Sales*

The volume of timber sold from Bureau forest lands in fiscal year 1954 was the greatest in the history of the Bureau. However, the sale value of this timber, reflecting the drop in lumber market during the year, was not so great as the preceding year's sale values. The volume sold in fiscal year 1954 and the sale value are <sup>1</sup> 696,115,000 board feet of timber and \$12,627,521, respectively. This is in contrast to volume and value of the 1953 fiscal year in which 653,714,000 board feet of timber valued at \$13,836,540 were sold.

Timber from the Oregon & California Railroad and Coos Bay Wagon Road grant lands accounted for <sup>1</sup> 618,900,000 board feet of the total sold and \$11,572,788 of the total value of such sales. Public domain timber sales accounted for the remainder or 77,215,000 board feet of timber valued at \$1,054,733.

The revenue received by the Bureau from the sale of timber is many times the appropriations made for all phases of timber management on all Bureau lands. Even with a substantial amount of the income turned over to the various counties and States in lieu of taxes, the return to the Treasury from these forest resources is a substantial sum each year over appropriations. This "profit margin" is proof that good forest management pays.

### *Timber Sale Plans*

On O. & C. and C. B. W. R. grant lands, the act of August 28, 1937 required that the forests be managed in accordance with the principles of sustained yield. In the beginning years of selling timber under these principles, sales were made largely in response to applications. This method of timber sales meant that the Bureau was constantly under pressure from someone wanting a tract here and someone else a tract there. The industry, depending on purchasing O. & C. stumpage, never knew until the formal advertisement appeared where the next sales would be located.

To build up an effective forest management program, a more positive approach was needed, an approach with the Bureau taking the

<sup>1</sup> Includes trespass settlements.

initiative in the selection of timber sale areas rather than the industry leading the Bureau. To accomplish this objective, timber had to be sold according to a plan.

Each year, now, the logging industry is requested to submit suggestions to the Bureau for tracts of O. & C. timber lands to be offered for sale the following year. These suggestions are studied, and when not incompatible with the Bureau's long-term forest management program, are included in the following year's sale plan. Where no suggestions have been received from the industry, or where the acceptable suggestions do not take the full allowable cut for any area, the Bureau supplements the suggestions with tracts of its own choosing in order that the full cut may be made. When the plan is completed, the plan is given wide distribution to interested persons and organizations. Once the plan has been accepted and advertised, the Bureau adheres to it insofar as is possible. The only reasons for making any alterations would be when conditions for sale had materially changed since the time the plan had been developed, as for example when necessary to sell salvage timber following a fire.

The results of selling timber following such annual timber sale plans have been favorable. Bureau personnel can now intelligently outline their work in advance and follow definite work plans. Industry now knows in advance the tracts of O. & C. timber that will be offered for sale and is thus enabled to make intelligent plans for timber acquisitions. For some areas it is hoped that 3 to 5 years timber sale plans will eventually be placed in operation with added benefit to both the Bureau and industry.

Timber sales on public domain areas are generally so widely scattered that a published plan would have limited value to the lumber industry in the areas affected. Therefore no sale program similar to those of the O. & C. districts is practical. To supplement application for public domain timber the Bureau, where possible, takes the initiative in selecting timber to sell, such selection of areas being based on the Bureau's own long-range timber sale plans.

### *Timber Salvage*

In the past 4 or 5 years, particularly in 1951, winter winds of hurricane velocity have uprooted many trees in the Douglas fir region of western Washington, Oregon, and northern California. In addition to windstorms, fires have also taken their toll of timber in this area. The total volume of timber killed by all causes is estimated to be in excess of 3 billion board feet on the O. & C. grant lands alone. On other lands with which the O. & C. lands are intermingled there is probably 6 billion board feet additional.



When Douglas fir trees are freshly killed, the cambium layer under the bark provides an ideal breeding place for the Douglas fir bark beetle. The millions of freshly killed trees in this region have thus provided such favorable conditions for these beetles to reproduce that the beetle population has swelled to epidemic proportions. With the beetles present in the forests in such numbers, the dead trees alone do not offer sufficient breeding ground, thus green trees are heavily attacked and soon die, adding to the forest toll. Throughout the forests, increasing numbers of red topped, dying trees indicate the extent of the beetle epidemic.

The only practical means of controlling or minimizing the depredations of the bark beetle is to log infested timber and remove it from the forest in order that it may no longer serve as a breeding ground for the beetles. This job is being done as rapidly as funds for access roads and the necessary personnel will allow. During the past fiscal year, 340,263,000 board feet of salvage timber were sold for \$6,317,642. Hundreds of millions of board feet of timber will be completely lost through deterioration before the present beetle epidemic has run its course. Much of the damage occurs in isolated pockets of timber which are too small in volume to be economically removed. Of the salvable volume, the job is now estimated to be 60 percent complete.

### *Forest Land Inventory*

One of the most elementary components of any land management program is an inventory. Forest land management is no exception. On the O. & C. and C. B. W. R. grant lands, where forest management has been developed to a high degree, forest inventories likewise have been developed to a high degree.

The first inventory on the O. & C. and C. B. W. R. properties was made in the period 1916-19 for the purposes of classification as required by the Revestment Act of 1916. Another inventory was made of the O. & C. lands in connection with the nationwide forest resource survey of the 1930's. A third inventory partially covered the lands following the passage of the 1937 O. & C. Act, which provided for the classification of the lands according to their highest use. Although none of these inventories, with the possible exception of the latter, was entirely suitable for use in forest management, it was possible by making adjustments to use part of the data from each to provide a usable base on which to build rough management plans. The first forest management plans for the O. & C. lands were of this type.

Shortly after the close of World War II, plans for an intensive up-to-date inventory of the grant lands were made. The time-honored method of ground cruising for making the inventory was discarded

in favor of the then new method based on the use of aerial photographs.

In the use of photographs for forest inventory purposes, each photograph is studied individually with stereoscopic equipment, and the various forest type classifications are delineated thereon. Any questionable photo interpretation is checked in the field. Upon the completion of the classification of forest types, the volume of the merchantable sawtimber in the stand is determined by random sampling.

About 22 percent of the O. & C. lands have been inventoried to date, under standards necessary for present-day forest management, and another 27 percent of these lands are currently being worked on. The overall inventory project on O. & C. lands calls for completion in fiscal year 1959.

The results of the inventory have been noteworthy. The volume of merchantable timber found in the areas where recent inventories have been made has been 20 to 40 percent greater than the estimates provided by the older inventory surveys. The allowable cut, based on the productivity of the forest soils as well as the volume of mature timber and the acreage of immature forest stands, has also been found to be higher than previously computed. This increase averages about 25 percent overall. If the same upward trend of volume and allowable cut holds throughout the entire inventory, the total volume of timber on the O. & C. and C. B. W. R. grant lands may well be found to be upwards of 50 billion board feet and the allowable cut more than 750 million board feet per year.

### *Controverted O. & C. Land Question*

In 1866 the O. & C. Railroad was granted all of the unoccupied odd-numbered sections of land in a strip 20 miles on either side of its right-of-way. An additional 10-mile "lieu selection strip" on either side of this "in place grant" was set aside as an area in which the railroad could select lands, acre for acre, to compensate for the lands previously settled within the "in place" grant.

At the time the O. & C. grant lands were revested in the Government in 1916, certain lands which lay both within the "lieu selection strip" and national forest boundary were unsurveyed. As rapidly as these lands were surveyed the title to the odd-numbered sections would have passed to the O. & C. Railroad had that company not lost its right to the grant lands. The Department of the Interior, under whose jurisdiction the revested O. & C. lands were placed by Congress, claimed these unpatented lands in the "lieu selection strip" as O. & C. lands. The Forest Service also claimed the lands in the "lieu selection strip" as national forest lands. From this jurisdictional disagreement the lands in dispute became known as the controverted O. & C. lands.

By mutual agreement between the two agencies of the Government, the administration of the controverted O. & C. lands has been done by the Forest Service. Income from the land has been impounded in a special account in the United States Treasury pending a decision on jurisdiction, either by the courts or by congressional action.

During the last year both the courts and Congress declared these lands to be O. & C. lands with the income, both past and future, to be distributed as is the income of other O. & C. lands. The sum of money now held in the O. & C. controverted land account is \$7,734,714, of which the counties in which the O. & C. grant lies will share 75 per cent or \$5,801,036.

Even though these lands have been declared to be O. & C. lands, Congress placed the future administration of them under the jurisdiction of the Forest Service, thereby giving that agency control over a solid block of Government timber lands. To facilitate administration and accounting, Congress further authorized the Forest Service to block these controverted O. & C. lands in each county by designating some national forest lands as controverted O. & C. and some controverted O. & C. as national forest lands, thereby eliminating the intermingled pattern of land classification.

Congress further instructed the Forest Service and Bureau of Land Management to exchange an additional 500,000 acres of intermingled national forest and O. & C. land within the next 2 years. The purpose of this part of the law is to remedy the overlap of jurisdiction of the two agencies over land in the same general area. It will also improve the management efficiency of both agencies and reduce the public confusion that has arisen in the past from differences in the management rules and practices of the two agencies operating in the same area.

### *Coos Bay Wagon Road Grant Land Reappraisal*

Under the provisions of the act of May 24, 1939, the counties of Coos and Douglas in the State of Oregon are paid the equivalent of taxes on the reconveyed Coos Bay Wagon Road grant lands which are located in each county. Such payments are based on the same tax millage rates that are applied to the intermingled private lands; however, the valuation of the grant lands which carry this millage rate is established by a committee appointed by the Secretary. The first appraisal committee completed its work in 1939 and for 10 years the payments to the counties were based on this appraisal.

At the request of the counties in 1947, a new appraisal committee was appointed for the purpose of making an up-to-date appraisal. An appraisal was made for the committee by the inventory section of the Bureau's Northwest region. This appraisal was based on data



obtained through use of large-scale aerial photos and was checked in the field for accuracy.

This appraisal, just approved, established the appraised value of the Coos Bay Wagon Road lands at \$883,966.00. In contrast, the appraised value of these lands, as established from the 1939 appraisal adjusted for depletion of timber by cutting to the year 1951, is \$710,078.31. With the raise in the assessed value, the two counties involved will receive an increase in tax receipts from these lands of approximately 25 percent. The values cited here are the values used for tax assessment purposes and should not be confused with the true market value which would be considerably higher.

### *Delegation of Authority*

Delegations of authority in connection with the reorganization of the Bureau have aided immeasurably the administration of the forest lands of the Bureau, particularly in the forest districts. The district foresters are now authorized to take more final actions on timber sales than ever before, thereby keeping the administration of Bureau forests at the "grass-root" level. This results in quicker and more satisfactory service to that segment of the public which is interested in the management of Bureau forests.

The delegations of authority allow the State and area office more staff time for directing the work of the district offices and frees these staff members from the routine chores that can be done equally well at the district level.

### *Forestry Advisory Boards*

In shaping up new policy or in strengthening old policy, advice is always sought from as many sources with diverging interests as is commensurate with the problem. A group of public-spirited citizens from various walks of life, joined together to give advice on policy questions, serve as a sounding board of public opinion and when used correctly such a group can render an invaluable service.

When the operating procedures and policies under the O. & C. Sustained Yield Act of 1937 were first being established, advice was sought from members of the lumber industry, from grazing and agriculture, from labor, and from the public at large. Men who represented these various interests and who were leaders in their respective fields were selected and appointed by the Secretary as members of an O. & C. advisory board. This group of men were consulted and their ideas were weighed before any major operating procedures or policies were put into effect. Although the board has no consti-

tuted authority to direct the Bureau in any way, its influence in Bureau affairs is strong.

The principle of advisory boards was so successful with the administering of the O. & C. timber lands as a whole that local boards have been set up—one for each of the O. & C. forest districts—to give advice regarding the carrying out of the various programs in the districts.

### *Trespass*

Considerable effort has been devoted to the prosecution of trespass claims. Collecting on these claims not only adds to the revenues of the Bureau, but also, and more important, serves as a deterrent for the future. Similar results are achieved by the prosecution of fire damage claims. Significant in this respect was the filing of a suit seeking \$1 million in damages from a lumber company in western Oregon.

### *Access Roads*

Access to the timber is vital to the forestry program of the Bureau in western Oregon. Access roads must be built through rough and mountainous country where costly duplicating road systems would be an economic waste. Much time is spent each year negotiating reciprocal access road agreements with owners of existing roads and with owners of intermingled lands over which roads must be built. Such agreements provide for joint use of roads in the removal of both the private and Government timber.

Wherever possible roads are being built by logging operators. However, Government construction with appropriated funds is desirable where speedy development of extensive road systems is needed to minimize losses from deterioration in timber following fires, storms and insect epidemics and for situations where the size and cost of a necessary road project are beyond the financial ability of the logging operators of average means. In the past few years funds have been appropriated for approximately 100 miles of such Federal access roads. When all of these projects are completed, the opportunity for small operators to compete for Government timber will be greatly increased. These roads, by expediting the removal of huge volumes of dead and damaged virgin timber, will prevent losses running into the millions of dollars.

## MINERALS

The flexibility of the laws under which the mineral resources are made available for use has within the last 3 years been dramatically

demonstrated in the Williston Basin in North Dakota and Montana. Since oil was discovered in North Dakota in April 1951, more than 5,000,000 acres of public lands in these two States have passed into the hands of the petroleum industry for exploration and development. A system of leasing which permits the transfer of mineral lands to private citizens so rapidly in response to an unexpected flood of demand is of great value both to those States in which such activity takes place and to the national economy itself.

New legislation was introduced, upon which the Bureau prepared reports, to encourage the expansion of mineral activities and to permit the multiple use of Government lands for leasing as well as for mining activities. In the administration of these laws, the Bureau of Land Management performs a basic and necessary activity which contributes greatly to the proper conservation and development of the Nation's mineral resources so that they will serve not only the needs of the present generation but also of generations to come.

As a contribution to management improvement, a monograph on Federal mining law was prepared. This is a collection of the principal court and departmental decisions covering all points within the jurisdiction of the Bureau and so arranged as to afford ready reference with respect to the legal problem involved.

### *Activities Under the United States Mining Laws*

Prior to May 1, 1954, the final processing of applications for mining patents was carried on in the Washington office. On that date, except for cases partially adjudicated, all applications for mining patents were decentralized to the land offices having jurisdiction over the lands applied for. There remained in process in the Washington office about 32 cases to be completed.

During the year, the regulations were amended to provide for the use of a certificate of title as well as an abstract of title in the patenting of mining claims; the mineral patent procedure bulletin was revised and manual procedures prepared relating to applications for patents covering lodes, placers, and millsites. An information monograph on mining locations, entries, and patents was prepared and issued.

The greatly expanded search for uranium resulted in the location during the year of a large number of mining claims, particularly in the Colorado Plateau area. This intensified activity has resulted in many thousands of additional inquiries at the land offices for information as to the availability of public lands for location as mining claims. In Utah a project has been carried on in cooperation with the Atomic Energy Commission and with the assistance of the petro-



leum industry for the microfilming of mining claim records in the county recorder's offices so that they would be more readily available in a central place for tracing titles to possessory rights acquired under the mining laws. Examinations and contest proceedings were continued during the year on the project for determining the validity of mining claims situated within the area which now constitutes the Marine Corps Base near Twenty-nine Palms, Calif.

### *Adjudication of Mineral Cases*

The largest single group of cases handled by the Bureau during the year was the processing of noncompetitive oil and gas offers to lease, and applications for leases. During fiscal year 1954, the new and reactivated noncompetitive oil and gas lease offers and applications for lease amounted to 41,902 cases of which a total of 39,559 were closed during that period. There were approximately 17,255 oil and gas lease assignments closed during this period.

Table 1 discloses the number of mineral cases adjudicated in the continental United States during fiscal year 1954.

TABLE 1.—*Adjudication of mineral cases, fiscal year 1954*

Type of Case	Unclosed cases, July 1, 1953 <sup>1</sup>	New and reactivated cases, fiscal year 1954	Cases closed June 30, 1954	Active	Sus-pended	Unclosed cases June 30, 1954
Mineral-patent applications.....	447	371	163	171	484	655
Oil and gas leases (n. c.).....	8,720	39,869	37,476	7,133	3,980	11,113
Oil and gas assignments (record title only).....	1,391	17,400	17,255	1,275	261	1,536
Oil and gas leases (comp.).....	7	7	13	1	-----	1
Oil and gas leases (acq.).....	3,847	2,033	2,033	3,009	788	3,797
Mineral leases (acq., n. e. s.).....	93	98	184	7	-----	7
Mineral leases (n. e. s.).....	147	58	101	4	100	104
Mineral permits (acq.).....	99	117	208	8	-----	8
Mineral permits (n. e. s.).....	1,228	1,260	731	575	1,182	1,757
Resource sales (mineral).....	25	53	44	6	28	34
Total.....	16,004	61,266	58,258	12,189	6,823	19,012

<sup>1</sup> Adjusted.

The oil strike made near Elko, Nev., in February 1954, greatly accelerated the oil and gas leasing activities in that State. Following the announcement of the discovery of oil in Nevada, it is significant to note that approximately 500,000 acres of Federal land in Nevada were leased for oil and gas purposes in the 4 days following this announcement. This greatly increased the activities of the local offices and the amounts received in filing fees and advanced rentals reached very high amounts. There was considerable increase in oil and gas activities throughout all the Western States. The increase in Wyoming was brought about by continued discovery of fields in that State.

Leasing activities in the Williston Basin continued apace. Throughout the Western States there was an increase in activities in mineral leasing not only for oil and gas but of phosphate, potash, and similar minerals as well as in mining activities.

### *Leasing Activities on the Outer Continental Shelf*

The act of August 7, 1953, known as the Outer Continental Shelf Land Act, vested authority in the Secretary of the Interior to issue permits and leases for the exploration and production of oil and gas and other minerals from the outer Continental Shelf.

Under section 6 of the act, mineral leases issued by the States of California, Louisiana, and Texas for submerged lands within the outer Continental Shelf as defined in the act, could be continued under the conditions outlined in the notice to holders of State leases published by the Department on September 14, 1953. As of November 5, 1953, the closing date set in the notice to holders, 404 State leases were filed for the necessary determination, of which 300 were for Louisiana lands and 104 for Texas lands.

A notice of proposed regulations concerning oil and gas and sulfur leases and operations in the outer Continental Shelf was published in the Federal Register on February 11, 1954. These proposals followed closely the proposals made by a group of operators now prospecting and producing oil and gas in the outer Continental Shelf under State leases. Industry was granted 30 days from the date of publication to submit such suggestions or objections which they deemed appropriate. Various suggestions were received, and on the basis of them, the regulations governing the recognition of the State leases and the disposition of the minerals in the outer Continental Shelf areas were approved, effective May 10, 1954. The adjudication of the section 6 leases is in progress. Pursuant to the authority prescribed in section 201.20 of the approved regulations, notices were duly published in the Federal Register calling for nominations of the areas to be offered for oil and gas and sulfur leasing off the States of Louisiana and Texas, such nominations to be submitted not later than August 3, 1954, for areas off Louisiana, and September 3, 1954, for areas off Texas.

The nominations received will be considered by the Department in the selection of areas to be offered for competitive bidding, and any published notice of lease offer will state the conditions and terms for lease, the place, date, and hour at which the bids will be opened. Such dates have been tentatively set for October 13, 1954, for areas off Louisiana, and November 9, 1954, for areas off Texas. The Department has established an information office at New Orleans, La., to handle outer Continental Shelf matters.

## *Reorganization and Decentralization of Washington Mineral Activities*

Following the recommendation of the survey team, the processing of all applications, including potash, phosphate, and other nonmetal-liferous minerals, was delegated to the Bureau's State land offices wherever feasible. A decentralization program was immediately undertaken to carry out this recommendation, and by the end of the fiscal year the processing of all applications for mineral patents and the adjudication of mineral claims was decentralized.

The decentralization to the land offices of the remaining types of cases was scheduled as follows:

<i>Date</i>	<i>Type</i>
August 1, 1954-----	All leasable minerals other than oil and gas
November 1, 1954-----	Producing oil and gas leases and related matters
February 1, 1955-----	All acquired lands cases, oil and gas, and other minerals

Besides assuming responsibility for the additional cases delegated from Washington, the land offices continued to carry on the adjudication of minerals cases previously processed, maintenance of mineral records, handling of mineral contest proceedings, collection of lands and minerals fees and rentals, and servicing inquiries from the public for information regarding the lease and disposal of mineral resources.

The responsibility for mineral examinations was placed upon the State supervisor and his staff. The minerals activity in the Washington office has been placed under the minerals officer, who with his staff will serve in an advisory capacity to the Director in the review of proposed or new legislation; the preparation of amended or new regulations, procedures, and manual instructions; in the review of problems involving mineral policy; and in the preparation of mineral programs for the Bureau.

### *Revenues*

The chief source of revenue to the United States from the use and disposal of resources on the public lands is from leases issued under the mineral leasing acts. The revenue in fiscal year 1954 from royalties and rentals under the mineral leasing acts was \$59,861,932, compared with \$49,176,703 in fiscal year 1953. The major source of receipts was from royalties, rentals, and bonuses for oil and gas leases.

A summary of bonuses received from competitive mineral leasing, by States, on lands within known geological structures, follows in table 2.



TABLE 2.—Competitive leases, fiscal year 1954

Mineral and State	Total		Acquired lands		Public domain	
	Acres	Bonus	Acres	Bonus	Acres	Bonus
Oil and gas:						
California.....	512.50	\$15,904.10			512.50	\$15,904.10
Kansas.....	240.00	14,245.60	160.00	\$12,025.60	80.00	2,220.00
Louisiana.....	120.00	1,355.00			120.00	1,355.00
Michigan.....	40.00	160.00			40.00	160.00
Montana.....	440.00	21,370.00			440.00	21,370.00
New Mexico.....	4,071.30	147,478.29			4,071.30	147,478.29
Ohio.....	179.38	197.32			179.38	197.32
Texas.....	954.51	25,218.72	954.51	25,218.72		
Wyoming.....	1,168.10	29,983.03			1,168.10	29,983.03
Total oil and gas.....	7,725.79	255,912.06	1,114.51	37,244.32	6,611.28	218,667.74
OTHER MINERALS						
Phosphate:						
Idaho.....	2,640.15	28,582.07			2,640.15	28,582.07
Montana.....	812.27	3,109.74			812.27	3,109.74
Coal: Oklahoma.....	400.00	420.00			400.00	420.00
Potash: New Mexico.....	440.00	27,060.00			440.00	27,060.00
Manganese: Tennessee.....	70.00	87.50	70.00	87.50		
Total other minerals.....	4,362.42	59,259.31	70.00	87.50	4,292.42	59,171.81

## INTERNATIONAL COOPERATION

A greater awareness of the Bureau of Land Management's experience in land and resource use, development, and management is resulting in increasing demands upon the Bureau for technical advice and assistance to other countries. The Bureau contributes its skills to the international scene in a variety of ways:

*Problems and Programs.*—During the past fiscal years, 16 Bureau technicians were working on overseas assignments exploring specific problems. These men were providing technical assistance under the technical direction of the Bureau on range management, forestry, cadastral engineering, and broad programs of land use planning. They were also consulting with other governments on basic land problems regarding ownership, leasing, and settlement, which are becoming very pronounced in individual security and country stability. In addition to the technical backstopping of its overseas employees, Bureau facilities and technical employees are constantly being utilized by the specialized United States agencies in foreign activities for advice and assistance on technical land and resource problems and programs pertaining to essentially all countries. There is a large demand for Bureau publications and other information by the nations of many countries.

*Training and Observation.*—Thirty-one foreign leaders and technicians were with the Bureau under the technical exchange program for periods ranging from 4 months to a year observing various phases of the Bureau's domestic program of land and resource management. One outstanding project was the leadership for the observations of

23 North Africa and Middle East leaders who studied arid land and resource problems in our west. Followup activities in their countries are showing that they gained much information which is leading to a fuller development of their land and natural resources with substantial benefits to the free world. During the year, the following 12 countries were represented by leaders and trainees: Thailand, Libya, Philippines, Formosa, Egypt, Iran, Iraq, Jordan, Lebanon, Pakistan, Saudi Arabia, and Turkey. In addition to this, the Bureau provided leadership and training programs overseas to develop young technicians who could handle land and resource problems peculiar to their country. Thus, the Bureau participates in technical training programs both here and abroad to effectively disseminate the skills and philosophy necessary for successful resource development. In addition to the formal technical exchange programs, Bureau facilities are constantly utilized by visiting technicians from all over the world.

*Conferences.*—The Bureau cooperates with committees, agencies, boards, commissions, and other bodies concerned with national and international land management problems. The Bureau technicians are frequently called on to contribute to international meetings and conferences. During fiscal year 1954, nine Bureau officials attended such conferences outside of this country.

The orderly development of our lands and natural resources contributed much to this Nation's greatness. Through its overseas program the Bureau cooperates with specialized international agencies in increasing the strength and prosperity of friendly nations by guiding other countries to a more fruitful use of their land and resources.

## SUMMARY

A summary of the Bureau of Land Management's major activities for the fiscal year 1954 shows:

### *Cadastral Engineering*

Approximately 1,320,000 acres of land were surveyed or resurveyed for such essential purposes as the development of uranium deposits and other mineralized areas, determination of the boundaries of valuable timber lands, school sections to facilitate State selections, small tracts for homesites and recreational purposes, execution of reclamation projects, town lots, and trade and manufacturing sites.

Of major importance were the completion of the leasing maps for approximately 12 million acres on the outer Continental Shelf offshore from Louisiana and the start made on similar maps for 8 million acres offshore from Texas. This work provides the basic data for describ-

ing and locating areas potentially very valuable for the production of oil and other minerals.

Interest in the leasing of land for mineral production in Alaska is increasing. Because the cadastral surveys in Alaska cover less than 1 percent of the Territory and are inadequate to meet the needs, protraction maps were prepared to provide a basis for leasing in order to assist oil and gas prospecting operations within a large area.

### *Lands*

The revocation of a large number of withdrawals which reserved public lands for uses no longer required resulted in freeing additional resources for development. Public lands actually needed for public purposes continue to be reserved. Obsolete withdrawals consisting of 1,777,000 acres were revoked during fiscal year 1954. New procedures were adopted and are operating effectively in providing a better understanding of the purposes of proposed withdrawals.

Applications to acquire public lands were received in a larger volume during the year than in the preceding year. Applications to acquire small tracts for home and recreation sites contributed most to the increased number of applications. The work accomplished in handling applications completed during fiscal year 1954 was considerably greater than in 1953, but due to the large receipt of applications it was impossible to reduce the backlog of pending cases. Aggressive steps through the reorganization and improved procedures are being taken to more effectively handle land cases.

Large areas of the public lands were classified to facilitate land disposal and land management actions. The acceleration of land classifications for relatively homogeneous areas contributed substantially to the handling of applications, several of which had been pending decisions for several years. Many tracts of public land were classified as suitable for disposal on which applications have not been filed. A program for disposing of these lands is underway. Several land ownership pattern adjustments are in process to provide a foundation for land management improvement by Federal and State agencies. Through the area land classification activity, much useful data was also obtained for water, soil, and other conservation practices in river basins.

### *Range Management*

The adjustment of grazing to the proper grazing capacity of the lands, through the reappraisal of range privilege adjudications and stocking, received primary emphasis in the range administration pro-



gram during the year. Reservation of forage for big game animals is being made to provide a proper balance between livestock and wildlife use of the Federal range. Range use supervision was better and more intensive than at any time since the Federal range was brought under regulation.

Sheeptight fences which have been developed recently in Montana and Wyoming on public ranges that are utilized by antelope have caused difficulties in the multiple use of the lands for both livestock and wildlife. A joint study of sheeptight fences was completed by the Bureau of Land Management and the Fish and Wildlife Service. The study provided the information needed for the development of suitable fencing on public lands to meet the requirements of the livestock industry and at the same time protect the public interest represented in the antelope and other wildlife resources.

Permits, licenses and leases were issued to approximately 29,000 stockmen during the year for the use of the public domain. These authorized grazing of over 9 million head of livestock. Through soil and moisture operations to improve the public lands and protect the resources, conservation practices were effected on 650,000 acres.

The soil and moisture conservation program is proving more successful through modifications which were accomplished for the conduct of this activity on a watershed basis extending the area covered to all the public domain within a watershed and providing complete watershed protection. Much progress was made in the projection of long-range conservation plans.

The soil and moisture work of the Bureau of Land Management is more and more attracting favorable attention. This reached a high point during the year when the Bureau at the request of the Foreign Operations Administration and in cooperation with other agencies, ranchers and many additional local people conducted an intensive 90-day training tour of range conservation projects including water-spreading, for 23 leaders from 9 Middle East countries. This was a continuing activity throughout the year and was followed up by a successful on-the-ground training center in Jordan sponsored by the Jordan Government and the Foreign Operations Administration in which Bureau officials participated. Jordan has placed a long extensive arid and semiarid range conservation program into operation. Several other countries are initiating similar programs for which they need technical assistance. Through this work a large amount of technical material was developed which is proving of benefit to technicians of the United States as well as those of other countries.

One of the most important programs of the Bureau is the control of halogeton, a weed poisonous to livestock which has invaded the western range lands. Over 4 million acres of the public domain is invaded by halogeton. Reseeding the ranges to useful grasses with

which halogeton cannot compete and chemical control under certain conditions are proving to be the most effective methods to eliminate or reduce the concentration below the critical point. As a direct halogeton control measure, 125,000 acres of range land were reseeded and 25,000 acres were prepared for seeding. The program has been in operation nearly 3 years with a total of 325,000 acres reseeded. A coordinated research program in which the Bureau is participating and supporting with the Department of Agriculture and land grant colleges is yielding important information essential to effective control of the plant.

### *Forestry*

The largest annual sale of timber from lands under the jurisdiction of the Bureau of Land Management was accomplished in fiscal year 1954 with the sale of 696 million board feet for over \$12 million. The total value was about \$1 million less than 1953 because of lower prices.

There have been a large number of Douglas fir trees killed on the O. & C. grant lands in Oregon in recent years. An epidemic of Douglas fir bark beetle has occurred because the dead trees provide an ideal breeding place for this pest. The Bureau is aggressively assisting in attacking this problem by removing and salvaging infested trees. This program is 60 percent complete. It was advanced substantially during the year by salvaging over 340 million board feet of infested timber.

Many long time programs for improving forest management were advanced. These included a current forest inventory utilizing aerial photographs and other modern techniques. A new appraisal of the Coos Bay Wagon Road grant lands in Oregon from which Coos and Douglas Counties receive tax equivalent payments was completed.

### *Minerals*

For the first time the final processing of applications for mining patents is being accomplished in the field with the establishment of State offices and the decentralization of the work through the recent reorganization of the Bureau of Land Management. This is resulting in improved service to the mining industry.

Over 58 thousand mineral cases were adjudicated and closed in fiscal year 1954. Approximately 40,000 of these were noncompetitive oil and gas lease offers and applications.

Mineral activities were very heavy during the year, primarily due to recent discoveries of oil and gas and intensified explorations for uranium and other fissionable materials. Thousands of inquiries as to the availability of public lands for locating mining claims for

fissionable materials were received. A project was carried out in cooperation with the Atomic Energy Commission and the petroleum industry for the microfilming of mining claim records in the county recorders' offices in Utah so that they would be more readily available for determining possessory rights acquired under the mining laws. New discoveries of oil in Nevada, Wyoming, Montana, and North Dakota and the issuance of permits and leases for the exploration and production of oil, gas, and other minerals on the outer Continental Shelf contributed substantially to the large workload in processing applications. New legislation and the demands of the public required the preparation of several regulations and other material to assist exploration and development of minerals in the public lands and lands in which mineral rights were acquired or retained by the Government.





# Fish and Wildlife Service

John L. Farley, *Director*



THE Fish and Wildlife Service exercises Federal responsibilities for the conservation of birds and mammals and fishes. Fish and wildlife constituted the first basic primitive wealth of our country. Through its predecessor agencies, the Service had its origin about three-quarters of a century ago in a growing national concern for the future of these resources that had once seemed inexhaustible. By efforts to ensure prudent use, by direct management of certain resources, and above all by the basic research essential to wise management, the Service has helped conserve these resources of fish and wildlife so that they still have tremendous economic values and inestimable recreational values.

Tomorrow's problem will be not merely the utilization of resources to produce maximum quantities of food, fiber, and other material things. More realistically, it will be the problem of maintaining the kind of living standard for the individual that we have come to regard as an American right. Our living standard includes more than necessities and is distinguished by things few other peoples in the world enjoy in the same measure as we: Recreation in the out of doors, including the free harvesting of public resources like game and fish, the use of parks and other recreational areas, and the enjoyment of common public property in other ways. These can be preserved only by a realistic and carefully calculated conservation program. Such a program must be based upon continuous, painstaking research.

## RESEARCH IN WILDLIFE MANAGEMENT

The Cooperative Wildlife Research Unit program, carried on jointly by the Fish and Wildlife Service, the Wildlife Management Institute, and the land-grant colleges and conservation departments of 16 States and the Territory of Alaska, is now in its 19th year. It has been effective in facilitating the training of wildlife personnel, in

promoting basic research, and in providing technical information to conservation agencies and the public.

A total of 221 wildlife students graduated from the unit schools during the school year 1952-53. About a fourth of these went into military service, and a fifth went back to school for advanced degrees. Most of the others obtained positions with State and Federal conservation agencies or educational institutions.

Research findings based on cooperative-unit studies were published and distributed as 129 technical papers, bulletins, and popular articles in 1953. Research projects numbered 248 and involved work on small and big game, waterfowl, fur animals, wildlife environment, and many other phases of wildlife management.

One section of eight research biologists conducted wildlife investigations on public lands, working closely during the year with public-lands agencies, chiefly the Forest Service. Specific projects, mostly long-term and numbering at least 20, included studies of deer browsing on plantations and forest areas, appraisal of damage by small rodents, production of food for wildlife, and ecological and life-history assignments dealing with deer, quail, woodcock, and other species.

Another section investigated wild fur animals. Population studies of the fur seals on the Pribilof Islands were made in cooperation with the University of Washington and produced facts of use in managing the fur-seal herd.

A preliminary sea-otter study, in cooperation with Purdue University, was made on Amchitka Island, Alaska, to determine the possibilities of restocking this marine mammal in areas of its former range. Studies on the ecology of the muskrat and the nutria in gulf-coast marshes were made in cooperation with the Louisiana Wild Life and Fisheries Commission.

Research on bird and mammal distribution was continued with increased emphasis, among the migratory game birds, on the mourning dove, Wilson snipe, and woodcock. Better census techniques for these migratory game birds are being developed to increase the knowledge of their distribution, numbers, and migration routes that is needed for management.

The bird-banding program, participated in by Service, State, Provincial, and private biologists, has been improved by better coordination with the Canadian Wildlife Service, modification of the reporting system, standardization of color-marking of birds, and issuance of a revised manual for bird banders.

A book on the biology, habits, and economic importance of the American bobcats is nearing completion. This will conclude a series of such books by Service biologists on the larger mammalian predators including the wolves, coyotes, mountain lions, and bobcats.



Search continues for foreign game species that might thrive in large areas no longer likely to be productive of native species. Two game birds from the Middle East and one from Spain are currently being tried out in cooperation with five Southwestern States.

The Patuxent and the Denver Wildlife Research Laboratories are the largest field stations maintained by the Service for wildlife research. Biologists and chemists at these centers study factors that threaten wildlife resources and develop methods for reducing wildlife damage to other resources. Primary factors adversely affecting wildlife resources include diseases and parasites, excessive use of herbicides and insecticides in the control of agricultural pests, and deterioration or loss of wildlife habitats through excessive grazing, certain farming practices, and drainage.

Current disease studies include determination of the cause of the Canada-goose losses that periodically become serious along the Atlantic coast, investigation of an unknown lethal virus infection found in raccoons at peak population levels, and research on the biology of the causative organism of trichomoniasis, a disease that causes severe mortality in mourning doves. Research in avian botulism, a cooperative project with the Rocky Mountain Laboratory of the Public Health Service, has pointed to minute invertebrates as a probable medium in which the bacteria, which cause avian botulism, multiply to outbreak proportions. A study of these invertebrates, and the soil in which they live, is under way.

Thorough knowledge of the causes of wildlife diseases and the means by which they are spread and sustained in populations will make possible improvements in management of wildlife and their habitat.

Control of weed and insect pests is a major problem. Chemical means developed in recent years often give efficient and economical control of pests; but some of these chemicals are known to be dangerous to human life; and many others have been shown, under some conditions, to cause high mortality among wildlife species. Within the limits of its resources, the Service evaluates effects of new chemical control agents on wildlife populations, and attempts, in cooperation with other interested agencies, to establish standards for formulations and rates of application that will meet the requirements for control without needlessly destroying wildlife.

Toward this same end, field tests are being conducted in cooperation with the Department of Agriculture and several State agencies to determine the possibilities for controlling the breeding of mosquitoes in impoundments by manipulating water levels rather than by drainage which is in conflict with development of marshes for waterfowl.

Other assignments deal with means of reducing wildlife damage to crops, stored foods, and other resources. Attempts are being made in cooperation with several State agencies to develop more effective devices and procedures to reduce bird damage to sweet and field corn, rice, and other crops. Aerial bombs mounted in panels and ignited by slow-burning rope fuses have been found, in early studies, to afford an economical form of protection; other methods, including the use of repellents, are being tested.

Damage by wild and commensal rodents is intensive and varied. Stored food materials are especially vulnerable to attack by rats and house mice. In some areas, reforestation is severely hampered by seed-eating rodents. Research at the Patuxent and Denver Laboratories includes developing and testing new chemicals for use as control agents or repellents. Service chemists have tested some 7,000 compounds during the past 5 years. This work has led to the development of several promising control agents and repellents, for protection from rodent damage. The Defense Department and various chemical companies have assisted in this program.

Foresters, whose attempts at reforestation by direct seeding have been seriously hampered by rodents, have cause for optimism in the unique performance of tetramine. This highly toxic compound, extensively field-tested as a seed treatment, kills some mice, "educates" others to leave seeds of the treated species alone, and translocates into seedlings. Unfortunately, the chemical has no known antidote and is far too hazardous for general use.

Through experimentation and extensive field testing a compound has been formulated which, when applied to dormant deciduous trees and shrubs, showed promise in preventing rabbit damage. No appreciable phytotoxicity was found in the treatment of 64 species of trees and shrubs, and the repellent film was highly resistant to weathering.

It has been estimated that more than 75 percent of American fur and game is produced and harvested on farmland. Consequently, what happens to the farm habitat may be the most important single factor influencing wildlife resources for tomorrow. The Fish and Wildlife Service, in cooperation with the Soil Conservation Service, has undertaken the task of evaluating various land-use practices that increase or improve the quality of wildlife food and cover on the farm without seriously interfering with efficient farming practices. Two experimental farms are operated at the Patuxent Research Refuge to test promising materials and procedures for creating living space for wildlife on the modern farm.

Quality and availability of foods are important factors in the distribution and survival of game birds in nature. One assignment, completed during the year, helps explain the distribution of the ringneck pheasant on the basis of availability of calcium in surface

soil or grit. This popular game bird cannot meet its calcium requirements from normal food sources, and where a calcium supplement is not available in the form of grit, the species cannot maintain an adequate reproductive level for survival. Other investigations under way include studies of the relations of certain vitamins, minerals, and protein levels to survival of pheasant and quail populations. Such studies offer promise of explaining success or failure of these birds in many parts of their potential ranges.

The most effective solutions to the problem of ever-shrinking waterfowl habitat are the creation of new impoundments and the improvement of natural marshes and water areas. Progress has been made in developing management methods for improving the dark, acid water impoundments characteristic of the Atlantic coastal region and for replacing marsh weeds with more useful species. This expands the carrying capacity of marshes for waterfowl. Manipulation of water levels in experimental impoundments has resulted in reduced turbidity and in increased growth of desirable food plants. Improvements have been made in the design of impoundment structures to provide more precise control of water levels to meet requirements of waterfowl management.

Since 1935 the Service has published *Wildlife Review* as an abstracting service for the wildlife field. In the past year, three issues were released covering 1,500 technical papers, bulletins, and books. This publication, with a circulation of approximately 3,100, is distributed nationally, and brings to conservation agencies and educational institutions up-to-date information on wildlife biology and management.

## RESEARCH IN FISHERY BIOLOGY

### *Coastal Fisheries*

In southeastern Alaska, with the building of a pulp mill in Ketchikan, logging in the area will double or even triple in the next few years. This will increase the problem of protecting pink-salmon spawning areas. Experiments over the past 4 years near Little Port Walter indicate that spawning areas between high- and low-tide levels in the mouths of many Alaska streams are as productive of pink salmon as fresh-water areas above the intertidal zones. Future measures to protect these streams from the effects of logging and other activities will include provisions to protect the intertidal spawning areas.

Circumstances that caused failure of the 1953 pink-salmon runs in southeastern Alaska occurred after the fry had left fresh water. The 1951 escapement appeared adequate (pink salmon invariably return at 2 years of age), and egg and fry survival conditions were excellent. The fresh-water survival index, which was established several years



ago and is valuable in measuring early mortality, was above average for the 1951 brood. Pink-salmon runs are noted for their extreme and erratic variability in returns. Past studies have shown that conditions affecting fresh-water survival have caused much of this variability. As part of ocean-survival studies, young fry have been marked by fin clipping and released as they were leaving fresh water. From mark returns, it was estimated that the ocean-survival rate of 1953 was only about one-tenth that of 1952. For the 1953 run the fresh-water survival as measured at Little Port Walter had been the highest in 12 years of records; catastrophic events in the sea allowed an ocean survival of only 0.3 percent, which wiped out any previous gain and produced the poor catch.

Passage of an unusually large run of blueback salmon over Zosel Dam on the way to spawning grounds on the upper Okanogan River in Canada shows that seriously depleted runs can regain former importance. Service surveys located virtually no fish as recently as 1941, but this year the Washington Department of Fisheries counters have recorded over 67,000 bluebacks passing through Zosel Dam fishways.

The large blueback run to the Okanogan this year results from combined contributions from 1949 and 1950 year classes. The return of such a large percentage of bluebacks in their third year is unusual, although it did occur to some extent in 1939 and 1940.

The Canadian Department of Fisheries, the Washington Department of Fisheries, and the Service have been jointly studying the Okanogan for the past 3 years. The Service has collected scales and has recorded lengths of some 525 bluebacks tagged at Zosel Dam. Scale examination shows that 98 percent of these fish, most of them females, were 3-year-olds from the 1950 brood.

A controlled-flow experimental stream has advanced natural-propagation studies of king salmon at Mill Creek in California. This project is being carried out by the Service and the California Department of Fish and Game. The stream has been created in the old north fork of Mill Creek at Los Molinos, which has been dry until recent years brought high water conditions. The channel has been deepened, and the water flow controlled by a gate at the head of a 30-inch culvert through an earth-fill dam at the channel head.

A study is being made of the early life history of king salmon. In experiments last year on egg survival in Mill Creek, there were severe egg losses because of extreme flood conditions. In present studies, plastic screen bags containing fertilized eggs were planted in November and will be periodically removed for comparison of survival conditions in Mill Creek with those in the controlled-flow channel.

Observations were continued on crab fishing and crab populations in the Bering Sea.

As part of a coastwise investigation of the Atlantic shad, to provide fishery-management information for the Atlantic States Marine Fisheries Commission, the Service tagged 238 shad in the Ogeechee River in Georgia.

By use of catch and fishing-effort records in conjunction with analyses made by biologists tagging and studying shad in the Connecticut River, it was possible to predict with only 5-percent error the 1953 run of 230,000 shad. With fishing effort at the level recommended by the Service, the 1953 run exceeded that of 1951 by 50,000 fish and that of 1950 by 100,000 fish.

The fishway at Holyoke (on the Connecticut River), a radically new flume and lock type developed by the Holyoke Water Power Co. in collaboration with the Service, passed 262 shad in 1953, and successful spawning occurred above the dam. Larger numbers of fish are required to build an upstream run, however, and improvements to the fishway are contemplated for the 1954 operating season.

Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, South Carolina, and Florida are participating in the Atlantic States Cooperative Striped Bass Program, which began in early 1954. The Service coordinates this program. Striped bass tagged in Maryland and New Jersey waters totaled 358.

### *Inland Fisheries*

Major emphasis in the Great Lakes program was on controlling the sea lamprey. Activities consisted largely in further testing and refining of electrical barriers, completing researches on lamprey biology, testing larvicides, and continuing a survey of streams tributary to Lake Superior. Fifty-eight electrical and mechanical sea-lamprey-control devices are operating on Lakes Superior, Michigan, and Huron. On Lake Superior, all United States streams having a known lamprey run are under control.

The completed limnological and fishery survey of Lake Superior has increased knowledge of the life history, distribution, and abundance of lake trout and other species. A similar survey of central and southern Lake Michigan was begun.

In an effort to learn why there are enormous overwinter losses of trout in most streams in the United States, four experimental stream sections at the Convict Creek, Calif., experimental station have been stocked with native and hatchery trout. In these sections, which total a mile in length, water flow and fish movements can be controlled. Stocking experiments to compare overwinter survival of stream-resident brown trout and hatchery-reared, catchable-size rainbow trout showed known losses to be slight for both species.

Research to improve fish-hatchery production and efficiency continued. New drugs and chemicals were tested to develop better prophylactic treatment for hatchery fish and to determine the efficacy of certain chemical compounds for attracting or poisoning fish. In fingerling brook trout, terramycin stopped mortalities caused by ulcer disease and furunculosis, while aureomycin had no effect. Treatment of brook trout with chloramphenicol produced more lasting results than treatment with terramycin only. Adding antibiotics to food of normal brook trout has a growth-promoting effect only if the fish are fed at an excessive rate. Identification of several new bacterial fish diseases is being attempted, and control methods are being investigated. Experiments were made to determine effect of fertilization on bacterial population of warm-water fishponds.

The 1953 blueback salmon feeding trials were a loss because of a virus outbreak in the experimental fish; the 1954 trials are in progress. A vertical incubator with a capacity of 1,000,000 chinook eggs or 2,000,000 blueback eggs was constructed and gave satisfactory results.

Tag recoveries in Yellowstone Lake and its tributaries indicate that after initial spawning there is little likelihood of postspawners surviving to enter the fishery or spawning a second time.

As a result of studies of the fishery resources of Shenandoah National Park, the Service has recommended to the National Park Service closing of all park streams to fishing during the 1954 season because of disastrous drought and flood effects on the trout population.

### *Marine Fisheries*

One of the most important aspects of the research at the Woods Hole, Mass., laboratory is the study of the biological effects on the haddock of the regulation of the International Commission for the Northwest Atlantic Fisheries which makes it illegal to fish for haddock on Georges Bank or in the Gulf of Maine with a net having meshes of less than 4½ inches inside dimension. The Commission approved the regulation, which has been in effect 1 year, on an experimental basis and requires a careful assessment of its effect. Use of the larger mesh saves small unmarketable fish and should increase the yield from each year class that enters the fishery.

Studies on redfish age and growth showed that age in the commercial catch varies from 6 to 20 years; age at first maturity is about 11 for males and 9 for females. Total redfish catch has leveled off in the Gulf of Maine, on the Nova Scotian Banks, and in the Gulf of St. Lawrence. Rich grounds on the Grand Banks declined 15 percent in abundance during the past year.

The continued survey of the Delaware Bay sport and commercial fisheries is designed to yield information on effects of industrial pol-



lution. A biological study of menhaden was begun with expectations of developing a research program on this species.

The Service, the Department of the Navy, the Georgia Game and Fish Commission, and the Florida State Board of Conservation (through the Marine Laboratory of the University of Miami) are making a biological, chemical, and physical oceanographic survey of South Atlantic coast waters. Six cruises have been completed with the vessel *Theodore N. Gill* to study currents, to study distribution and abundance of fish eggs, larvae, and juveniles, to discover spawning areas of various fish, and to carry out a biochemical study having a bearing on the biological potential of the area. Swordfish, sailfish, dolphin, and mullet eggs or small larvae were taken in the Gulf Stream along the Florida coast.

Cruises of the vessel *Alaska* found fish larvae most abundant in northern gulf waters from Galveston to Chandeleur Island and in southeast gulf waters from Sanibel Island to Key West. Concentrations of larvae occurred close to shore or in shallow waters rather than in the central open gulf.

Mass mortalities of fish have occurred in Florida west-coast waters. The microscopic organism *Gymnodinium brevis*, which causes the kills when it occurs in extreme numbers, has been in coastal waters since last September. Research to determine causes of red tides further confirms earlier theories that river effluents carrying organic nutrients and the correct combination of temperature and wind conditions produce a suitable environment for rapid reproduction of the microorganisms. Laboratory cultures of *Gymnodinium brevis* were established through use of Florida-soil extracts, fish-flesh extracts, trace elements, sulphides, and vitamin B-12, along with strong light, to determine its chemical and physical requirements for use in developing possible control measures.

The Service cooperated with the National Park Service in taking a census of the California gray whale as it passed southward along the California coast to Baja California lagoons to calve and breed.

The Service continued study of the Pacific sardine in cooperation with the Scripps Institution of Oceanography, California Division of Fish and Game, California Academy of Sciences, and Hopkins Marine Station of Stanford University. The sardine catch was again low, and southern California has ceased to be an important spawning center. The smaller amount of spawning off central Baja California than in 1952 and previous years indicates a smaller spawning population in that area. Small numbers of sardines surviving from 1949, 1950, and 1951 spawnings constitute the spawning stock. The center of spawning off central Baja California was 40 miles north of the usual center of recent years.

The most abundant larvae taken on these cruises are hake, whose center of abundance is off southern California and adjacent Baja California, between Point Conception and San Quintin Bay. Other species under study are the anchovy and jack mackerel. Anchovy larvae occur in a continuous band between Point Conception and central Baja California.

Vessel scouting for tuna in the central Pacific showed that expansion of the Hawaiian tuna industry will depend largely on measures to increase the geographical area that the fleet can cover, through construction of larger, better-equipped vessels and improvement of the fishermen's navigational ability. Landings of large quantities of yellowfin tuna show that there is an unexploited and potentially highly valuable commercial fishing resource within ready reach of the Hawaiian Islands. Albacore, the highest priced of the tunas, undoubtedly would be a profitable secondary product of a yellowfin fishery in those waters. Data were collected which will help to determine seasonal changes in waters and to explain fluctuations in the skipjack catch. Yellowfins are being tagged in an effort to trace their seasonal migrations into and out of Hawaiian waters.

Data collected from waters from the surface down to 4,000 feet indicate rich oceanic waters about 800 miles north of Hawaii in a region of transition from the warm westerly flowing north equatorial waters, found typically around the Hawaiian Islands, to the colder easterly flowing north Pacific drift waters. In this boundary region between the two currents, plankton was relatively more abundant than to the north or south. Albacore were caught in this transition zone due north of Hawaii, but none were caught farther to the east.

### *Shellfisheries*

Productivity studies to determine how many bushels of hard clams can be removed each year from Greenwich Bay, R. I., without causing depletion should assist each State having the problem of managing a public clam fishery. A fence was built that successfully protects clams both from green crabs and from horseshoe crabs. Several New Hampshire and Massachusetts towns are interested in building fences similar to this one. Studies are being made of the biology of green crabs, which are being tagged in an effort to trace their migratory routes.

Studies at Milford, Conn., on oysters from different geographical areas show that different physiological races of oysters exist. Bulletins informed the industry and biologists during the summer of 1954 of oyster spawning and setting progress. Oysters were successfully cultivated in salt-water ponds. European oysters, *Ostrea edulis*, live and propagate under New England conditions.

Progress has been made in research on problems of oyster cultivation peculiar to the Gulf of Mexico, including oyster growth rates and seasonal reproductive cycles of oyster predators, such as the drill, boring clam, and boring sponge. The northern Gulf area does not provide an especially good environment for hard clams.

Studies continue at Beaufort, N. C., on accumulation and retention of radioactive elements, particularly strontium, yttrium, and cesium, in bodies of marine invertebrates of economic importance.

The 1953 joint survey, with the State of Maryland, of the Maryland part of the Chesapeake Bay and tributaries found that market-size oysters are fewer this year than last. Small oysters are fewer than market size this year, which may mean a smaller harvest for 1954-55.

Spatfall in all places, except in some Eastern Shore tributaries, was sparse and will be responsible for a continued low oyster yield from Maryland.

## NATIONAL WILDLIFE REFUGES AND THE DUCK STAMP

Two decades (1934-54) of intensive wildlife-refuge acquisition and development have been completed. During this period, the area of the national waterfowl refuges has increased from 851,689 acres to 3,269,549 acres. Without this expanded program and the opportune legislation that made it possible, it is doubtful whether waterfowl populations could support the present level of public hunting. In view of the generally favorable conditions, a review of the enabling legislation and accomplishments thereunder is in order.

In the early part of this century, migratory waterfowl had been seriously reduced through lack of adequate protection, and several important species were on the verge of extinction.

In the early 1920's, following proclamation of the Migratory Bird Treaty of 1916 and the treaty-enabling act of 1918, legislation proposing the establishment of a system of national waterfowl refuges was introduced in the Congress. This legislation, in modified form, was finally adopted as the Migratory Bird Conservation Act of February 18, 1929, and authorized the establishment of inviolate migratory-waterfowl sanctuaries. It authorized appropriation of \$875,000 in the first 3 years and \$1,000,000 a year in the next 7 years, for the acquisition and development of the refuge system contemplated by its provisions. Appreciable funds authorized by this legislation were not forthcoming, but emergency funds totaling \$14,500,000 were allotted, largely for the continuation of this work in connection with unemployment relief, submarginal-land retirement, and drought-relief programs, which enabled refuge acquisition and development to continue with redoubled vigor.



The third act in furtherance of the treaty for the protection of birds migrating between the United States and Canada was the 1934 Migratory Bird Hunting Stamp Act. This legislation requires each person over 16 years of age who hunts migratory waterfowl to obtain a Federal duck stamp each season (stamps now cost \$2 each).

From 1935, the first year of revenue under the new act, to June 30, 1953, about \$35,000,000 was received. Almost \$30,000,000 of this was spent on the waterfowl program.

This however, is only part of the picture. Duck stamp funds have been used in the development and operation of some 3,000,000 acres which were made available to the Service from other sources. This large total includes areas made available for waterfowl-refuge purposes as a secondary use on irrigation reservoirs, flood-control projects, and drainage districts, as well as lands acquired specifically for waterfowl with other funds made available in the early days of the restoration program. Thus the duck stamp funds have become the lifeblood of the Service's waterfowl-refuge program, even though only about one-sixth has been used for actual land purchase.

One of the finest areas in the entire refuge system was secured recently with only a small amount of duck stamp money needed to provide a few critical tracts. The bulk of the refuge—140,000 acres—was made available at no cost by the central and south Florida flood-control district. Known as the Loxahatchee Waterfowl Management Area, it is just west of Palm Beach, Fla. A few hundred acres outside the dike have been acquired or are being acquired with duck stamp funds, to provide farmland for waterfowl-food production and a headquarters site.

The Salt Plains National Wildlife Refuge in north-central Oklahoma, originally established on public-domain land by Executive order, is another good example of a cooperative approach. Shortly before World War II, the Corps of Engineers became interested in the salt flats as a flood-control project. Agreement was reached with the Corps, whereby the salt flats were used for a flood-control impoundment and the additional lands acquired for the project were transferred to the Fish and Wildlife Service for operation as part of the Salt Plains Refuge. Duck stamp funds were used to acquire some 1,029 additional acres needed to round out the refuge. A diversion structure and ditch to supply water for a series of subimpoundments, as well as the dikes and control structures for the subimpoundments, have been financed from duck stamp funds. The 31,000-acre Salt Plains Refuge is now one of the outstanding refuges of the south-central plains wintering area.

The Mud Lake National Wildlife Refuge in Minnesota, an excellent waterfowl-breeding area of more than 60,000 acres, also came to the Service at practically no cost—a few acres had to be purchased to

round out boundaries. These lands were originally acquired by the Resettlement Administration. This is one of the few Federal refuges on which moose are found; about 100 head make Mud Lake their home.

In Nevada the famous Carson Sink-Stillwater Slough area of almost 200,000 acres, known to western duck hunters since the beginning of irrigation in Nevada, is now being intensively developed under a joint program by the State, with Pittman-Robertson funds, and the Fish and Wildlife Service, with duck stamp money. All the lands in this project are provided by the Truckee-Carson irrigation district. Draglines and dirt-moving equipment are creating new and improved waterfowl pools and ditches and water-control structures for better water distribution, all of which will guarantee a perpetuation of the sport of duck hunting in one of the finest areas in the West.

When the Denison Dam was constructed across the Red River, boundary between Texas and Oklahoma, it flooded several shallow bays with excellent waterfowl potentials. Two Federal refuges were created: Tishomingo of about 13,500 acres in Oklahoma, and Hagerman of about 11,500 acres in Texas. Subsequent farming and other developments for waterfowl have brought large numbers of wintering ducks and geese into the Red River Valley for the first time within the memory of local residents, and excellent shooting has resulted over a wide adjacent area.

The Santee National Wildlife Refuge on the Santee and Cooper Rivers in South Carolina is a similar area, made available to the Service for wildlife purposes as a part of the Santee-Cooper flood-control and hydroelectric project.

Two of the finest refuges in the South were developed on lands acquired and flooded by the Tennessee Valley Authority. The Wheeler National Wildlife Refuge of some 35,000 acres in northern Alabama and the Tennessee National Wildlife Refuge of approximately 50,000 acres in western Tennessee have become two of the Nation's finest waterfowl wintering areas through the proper management of food and cover.

Purchase of land is merely the initial step in the establishment of a public waterfowl refuge. In addition to the posting and fencing of boundaries, fresh water and food must be provided. Sometimes these operations prove difficult. For example, the famous 50,000-acre Mattamuskeet National Wildlife Refuge in North Carolina looked like a natural area. An abandoned drainage project reverted to its former status as a lake, is one's first impression. The real story is far from being that simple. Old outlet ditches had to be deepened and new ones dug to permit the lowering of water levels in summer to get increased growth of shoreline vegetation. In these moist shoreline flats, willow and other shrub growth had to be eliminated with bulldozers and disks to allow three-square bulrush, a top duck and goose food, to come in.

And the disking had to be repeated every year or two to keep the willows from again taking over. Carp had so infested the lake that they had destroyed practically all of the aquatic food plants. Millions of these rough fish were trapped or seined, and sold, with the result that aquatics are coming back even beyond the greatest expectations.

Mattamuskeet is now one of the most famous waterfowl wintering areas of the Atlantic coast. Here, from 60,000 to 80,000 Canada geese and 80,000 to 150,000 pintails, mallards, black ducks, and teal trade back and forth to adjacent Pamlico Sound and Swanquarter Refuge while hundreds of stately whistling swans—rigidly protected—fly unconcernedly overhead. About 10,000 acres of the 50,000-acre refuge have always been open to public shooting, and hunters normally bag from 3,500 to 5,000 Canadas and a like number of ducks from blinds managed by the conservation department of the State of North Carolina. Hunters on farms surrounding Mattamuskeet account for as many or more geese as are taken on the refuge.

While only a small number of waterfowl areas have had to be purchased in their entirety with duck stamp funds, this source of money has permitted the acquisition of strategic tracts on some 60 areas and the development of many more areas acquired by other means. Up until 1942 good sources of labor for refuge development were available under the Works Progress Administration and Civilian Conservation Corps programs. The big problem was to provide the equipment and materials to go with this labor. Duck stamp funds supplied this need, and with an almost unlimited labor supply, the waterfowl refuge development program on lands obtained primarily from other sources was advanced many years.

## FEDERAL AID TO STATE PROJECTS FOR THE RESTORATION OF FISH AND WILDLIFE

### *Wildlife Restoration*

Activities under the Pittman-Robertson program (Federal aid to the States in wildlife restoration) are geared to receipts from the excise tax on sporting arms and ammunition. Revenues were greater than in the preceding year but the carryover was considerably less, and there was a slight decrease in number of projects and in funds obligated. The apportionment was \$11,904,903; program participants submitted 740 projects that encumbered \$13,358,632. With the States' contribution added, funds for the program amounted to \$17,811,509.

To provide wildlife resources for the future and to permit maximum hunting recreation today, investigations by the States were concerned with gathering data on wildlife populations, food conditions, and harvest results. This information provides the basis for setting seasons



TABLE 1.—*Land acquired or in process of acquisition for wildlife conservation purposes under the Migratory Bird Conservation Act, by exchange, and by other acts of Congress, fiscal year 1954*

[In acres]

State and refuge	Acquired			Pending title conveyance
	By other than purchase	By purchase	Total	
Arkansas: Big Lake.....		161	161	
California:				
Salton Sea.....				3
Sutter.....		344	344	156
Colorado: Monte Vista.....		2, 132	2, 132	
Florida:				
Chassahowitzka.....		359	359	3, 875
Loxahatchee.....		1, 032	1, 032	1, 328
Saint Marks.....		8	8	18
Sanibel.....				100
Georgia:				
Okfenokee.....	4		4	
Piedmont.....	798		798	243
Idaho:				
Deer Flat.....				59
Snake River.....	21		21	
Kansas: Kirwin.....	9, 911		9, 911	
Maine: Moosehorn.....		31	31	
Maryland: Chincoteague.....		323	323	
Michigan: Shiawassee.....		494	494	2, 941
Minnesota:				
Rice Lake.....		222	222	296
Upper Mississippi.....		60	60	405
Mississippi: Noxubee.....	406		406	3, 125
Missouri: Mingo.....				14
Montana: Red Rock Lakes.....				1
Nebraska: Fort Niobrara.....		640	640	
New Jersey: Brigantine.....				48
New York: Wertheim.....				8
North Dakota:				
Des Lacs.....	70		70	
Lostwood.....				490
Oklahoma: Salt Plains.....				80
Oregon: Malheur.....	156		156	2, 766
South Carolina: Carolina Sandhills.....				51
Texas:				
Laguna Atascosa.....		25	25	2, 265
Santa Ana.....				34
Vermont: Missisquoi.....				750
Virginia:				
Chincoteague.....				25
Presquile.....	1, 329		1, 329	
Washington:				
Columbia.....		40	40	185
Turnbull.....	680		680	4
Willapa.....	160		160	
Wisconsin:				
Horicon.....		53	53	60
Upper Mississippi.....	4	7	11	97
Total.....	13, 539	5, 891	19, 470	19, 427

and bag limits and for defining areas to be opened to hunting. Numerous relaxations in hunting regulations have resulted. Several States joined the "two-deer" or "any deer" ranks this year, to accomplish desired herd reductions. Arizona, Colorado, and New Mexico permitted limited harvests of their small, but growing, populations of bighorn sheep, since field studies indicated the desirability of cropping surplus rams.

Each year the States move closer together in resolving mutual wildlife problems. In addition to waterfowl councils, joint mourning-dove

studies, and exchange of wildlife for restocking, the most recent move was the creation of a big-game range revegetation committee by the western States that have a common problem.

The Turkish chukar partridge introduction program was completed. Nearly 3,000 birds were flown in from Turkey and liberated in Arizona, New Mexico, and Utah in the 3 years of this experiment. A cautious note of success can be sounded, for there are several reports of reproduction in the wild.

Widely ranging investigative findings, in the form of bulletins, books, and articles in magazines, totaled 446 during the year.

Improvement and restoration of habitat for wildlife again received major emphasis; 36 States carried on this type of work. The trend toward quality rather than quantity was most evident in food and cover planting activities. In many States, the amount of planting stock was reduced, and increased efforts were made to meet habitat requirements with better species and site selection, more attention to proper planting, and adequate care of plantations.

Development of waterfowl areas was under way in 46 States. A number of States are establishing new goose flocks by holding a nucleus for nesting and by providing adequate feeding and resting areas for these birds. Other restoration included the creation of numerous small potholes, many 500- to 2,000-acre marshes, and several major impoundments in the 10,000- to 18,000-acre class.

In the west, considerable work was done on fencing and reseeding suitable browse and forage plants to aid in the restoration of big-game ranges, the protection of watersheds, and the management of all game and domestic species using the lands on which this improvement work is being done. Supplementing these measures was the construction of roads into inaccessible areas to make possible adequate harvests by hunters in localities where too many deer or elk are causing damage to the range. Forest game species on public lands and on private lands under lease to the States have benefited from habitat manipulations which improve food and cover conditions. In several States, cooperation with private and public forestry agencies, by selective logging to save deer-concentration areas, is meeting with much success.

With most of the game ranges fairly well restocked, transplanting efforts continued to decline. Deer and wild turkeys were accorded most of this restoration attention.

The States purchased 88,389 acres of land and leased 139,172 acres for wildlife purposes during the year. In addition, 2,827 acres were acquired for combination fish and wildlife areas. Reflecting in part the increasing scarcity of lands for game, the average price per acre rose from \$26.22 in 1953 to \$30.09 in 1954.

As usual, acquisitions were made for the benefit of many game species. Western States continued to buy lands for urgently needed

big-game wintering ranges. Such purchases were made in new areas as well as in older ones where interior acreages of privately owned lands were acquired.

### *Fish Restoration*

Funds available for financing the Dingell-Johnson program (Federal aid to the States in fish restoration) totaled \$4,299,916, a 60-percent increase over the preceding year. This record income was urgently needed because of the demands made by the constantly increasing numbers of anglers for more places to fish and improvement in the quality of fishing. Approval of 301 projects resulted in net obligations for the year of \$3,561,017. Projects designed to increase the store of facts useful in carrying out better-planned fish management continued to dominate the program; of the projects approved, 136 made possible the conduct of investigations. Greatest emphasis was on general surveys by means of which the States are making basic inventories of their sport-fishing resources. Detailed studies of a single body of water or of a single species or group of species of fishes characterized another important group of research projects; for example, the careful evaluation of the effectiveness of various types of rough-fish control received important consideration.

One of the essential components of any fish-management program is the collection of information on the harvest of fish. Facts of this kind are to the fish manager what production records are to the manager of an industrial plant; in a sense, they provide a means whereby the success of a State program may be gaged. Studies of this type received substantial attention.

There has been a noticeable increase in attention to marine and anadromous fishes. Of particular significance is the cooperative study of the striped bass, which is being carried out by the Federal and State Governments on the Atlantic coast. Seven States are now engaged in research projects set up as part of an overall fact-finding operation coordinated by the Fish and Wildlife Service and financed in part with Federal Aid funds.

Major attention is being given by the States to the creation of new public fishing waters. Toward that end, construction work was performed on 29 projects to impound more than 2,500 acres of water. These impoundments ranged from 1½-acre ponds to 230-acre lakes. Areas for future development were obtained by 12 States which purchased nearly 3,000 acres of land and water on 35 projects.

Many bodies of water have lost their productive capacity, owing to shifts in species composition. This may mean an overabundance of carp or other inferior fish, or merely an overpopulation with resultant stunting of preferred game species. Frequently, the most efficient method of restoring these waters to peak productivity is to eliminate



the entire fish population and then to restock with those species that have demonstrated their ability to supply the fishing demand. Actions of this type were taken on 37 lakes with a total area of 7,500 surface acres. Of particular interest was the reclamation of the James River above the Jamestown dam and reservoir in North Dakota.

There are many waters in the United States that supply very little fishing because it is difficult to reach them. This may be due to the character of the surrounding terrain, or to private ownership that bars entry by the public. To remedy such situations, 34 access areas were acquired or developed with the help of Federal Aid funds during the year.

As a part of its general responsibility for the administration of the program, the Fish and Wildlife Service began the publication of the Dingell-Johnson Quarterly. This publication contains abstracts of reports on current findings from research projects and information on general program status. At the year's end, publication was up to date for the 3 years of program operation. A second number of the circular survey of fishery activities was issued under the title "Survey of Sport Fishery Projects, 1954." This publication summarizes fishery research and management projects being carried out by various governmental agencies and institutions throughout the United States. Reports from 104 agencies, covering 729 projects, were included.

## ADMINISTRATION OF FEDERAL STATUTES FOR PROTECTION OF FISH AND WILDLIFE

During the year, Federal-State cooperation in the management of waterfowl was greater than ever. Flyway councils, whose membership includes all State conservation departments, reached full development. These make possible better coordination of flyway programs, with greater mutual understanding of objectives and of the parts to be played by Federal and State agencies, and with minimum duplication of effort. Twelve States contributed 21 employees, and paid their costs, to work with Federal personnel of the United States and Canada in banding large numbers of waterfowl in important breeding areas in Canada. Information from banding returns by hunters will clarify migrational patterns. Progress was made in defining a statistical program to provide detailed knowledge of the mechanics of hunting. All these operations should make for more realistic and biologically sound regulations, and should ultimately permit a more intensive harvest of waterfowl without jeopardizing basic breeding stocks.

Law-enforcement agents of the Service, in cooperation with the enforcement division of the California Department of Fish and Game, completed investigations that put an end to flagrant market-hunting

violations in that State. Twelve professional market hunters and seven nightclub and restaurant operators were convicted in Federal court of violations of the Migratory Bird Treaty Act regulations; aggregate sentences were fines of \$4,900, jail sentences of 6 years and 9 months, and 7 years probation. The highest individual fine was \$1,200 and the longest jail sentence was 18 months. Seven cases involving market hunting or purchase of migratory waterfowl, resulting from these investigations, are still pending.

Officers of the Service cooperated with State conservation-law enforcement men in successfully prosecuting individuals who were commercializing on resident game species. In California, one person was found guilty in State court of selling deer; sentence imposed was a fine of \$1,500 and 6 months in jail. In West Virginia, one person was convicted in Federal court of transporting to that State a deer unlawfully taken in Maine; sentence imposed was an \$800 fine and 8 months in jail. Fifty-five cases involving violations of the Lacey Act, wherein wild birds or animals were unlawfully taken in one State and transported interstate, were successfully terminated in State court.

Service agents also participated in investigations that resulted in court actions for violations of the Black Bass Act. The first regulations adopted pursuant to the Northwest Atlantic Fisheries Act were enforced by Service agents and resulted in seven convictions in Federal court in Massachusetts.

Amended regulations relating to the importation of birds and mammals will help persons planning to import birds and mammals into the United States for the cage-bird trade, for scientific purposes, and for exhibition in public zoological parks.

Under regulations adopted pursuant to the act of July 17, 1952 (66 Stat. 755), 33 permits were issued to authorize the entry of certain bird skins bearing feathers for use in the manufacture of artificial fishing flies and millinery. Total imports under these permits were as follows: Pheasants, 940; grey jungle fowl, 4,455; mandarin duck, 0.

At the end of the fiscal year the following most common migratory bird permits were in effect: Propagating, 3,055; scientific collecting, 1,675; bird banding, 3,588. Actions in connection with these permits were as follows: New permits issued, 1,465; renewals, 243; amended, 80; revised, 109; canceled, 325; revoked, 254.

During calendar year 1953, 15,404 ducks and 1,638 geese were sold by permittees for propagating purposes, 12,845 ducks and 366 geese were sold for food, and 22,613 ducks and 1,580 geese were liberated. In the same period, 47,001 migratory waterfowl were being reared in captivity. Under experimental-breeding permits, 573 mourning doves, 81 white-winged doves, and 63 band-tailed pigeons were being reared in captivity. For scientific purposes, 17,100 migratory birds, 18 sets of eggs, and 2,202 eggs not in sets were collected.

TABLE 2.—Summary of penalties imposed for violations of wildlife-conservation laws, fiscal year 1954

	Convictions	Fines and costs	Jail sentences (days)
Migratory Bird Treaty Act <sup>1</sup> .....	479	\$36,763	<sup>2</sup> 3,145
Migratory Bird Conservation Act.....	47	1,899	( <sup>3</sup> )
Migratory Bird Hunting Stamp Act.....	18	575	( <sup>4</sup> )
Lacey Act.....	5	1,050	240
Northwest Fisheries Act.....	7	950	-----
State laws, cooperative prosecutions <sup>5</sup> .....	4,557	178,318	1,101
Total.....	5,113	219,555	4,486

<sup>1</sup> In the fiscal year, 522 Migratory Bird Treaty Act cases were disposed of as follows: Convictions, 479; dismissals, 6; not prossecd, 16; adjudged not guilty, 21.

<sup>2</sup> 2,820 days suspended.

<sup>3</sup> 180 days suspended.

<sup>4</sup> 60 days suspended.

<sup>5</sup> Includes 2,314 cases relating to the taking of migratory birds and interstate shipments of game animals and game fishes. In addition to these cases, the Service has not received final disposition on 150 cases involving State game law violations, which were referred to State agencies for handling.

Part of the Pribilof Island fur-seal receipts were again made available for equipment and added personnel for enforcement of the Alaska Game Law. This, together with the excellent cooperation of military authorities, has greatly improved the protection afforded fish and wildlife in the Territory. The recently established patrol station at Tok Junction, entry point of the Alaska Highway, has become one of the more important stations in the Territory. Here, thousands of hunters and fishermen entering Alaska for the first time, on the new highway, have an opportunity to obtain first-hand information about hunting and fishing regulations, and the Service has an opportunity to impress upon newcomers the need for cooperation in obeying the regulations.

Enforcement problems in Alaska are increasing because of new roads, use of surplus military equipment, home-built tundra crawlers, and a new junior-size combination tractor-caterpillar capable of traversing most of the terrain in the Territory. It is also interesting to note that both commercial and private planes in appreciable numbers were flying the back country in search of moose and caribou. It was estimated that, in October 1953, wild game valued at more than \$1,000,000 was held in cold storage.

Enforcement officers of the Service contributed to conservation programs in the Territory, by giving instructions in wildlife-resource conservation, sportsmanship, proper handling of firearms, and care of trophies and of game used for food.

During the fiscal year, 221 cases involving violations of the Alaska Game Law were concluded. Fines amounted to \$20,067; of these, fines of \$2,709 were suspended. Jail sentences totaled 1,950 days, of which 1,380 days were suspended. Seizures included firearms, traps, fishing rods, 80 skins of fur-bearing animals, 63 whole big-game animals, and 440 pounds of big-game animal meat.



## RIVER BASIN DEVELOPMENT AND WILDLIFE NEEDS

Of 141 reports this year by the Service on water developments planned by Federal agencies or by private interests under Federal permit, 44 were on Corps of Engineers projects, 40 on Bureau of Reclamation, 6 on Department of Agriculture, and 51 on power projects requiring license from the Federal Power Commission. A number of reports on special studies also were prepared.

In line with the Coordination Act of 1946, general plans have been completed for the use of four reservoir areas for wildlife management. At the Canyon Ferry Reservoir in Montana and the John H. Kerr Reservoir in North Carolina and Virginia, lands have been made available to the State conservation departments for management. At McNary Reservoir in Oregon and Washington several Federal and State areas were established, and at Kirwin Reservoir in Kansas a Federal refuge is being set up.

The Service is giving careful attention to the Bureau of Reclamation's plan for the Garrison Diversion Unit, which contemplates the construction of several reservoirs, with associated facilities, and the irrigation of about 960,000 acres of lands in North and South Dakota. The Service administers 10 National Wildlife Refuges in the area to be directly affected.

Much progress has been made toward preservation of the important sport and commercial salmon fishery of the American River of California. This resource will be seriously affected by inundation of much of its spawning grounds by the Nimbus Dam which is being constructed by the Bureau of Reclamation. The Service and the California Department of Fish and Game have jointly concluded that construction of a hatchery near the dam will be necessary to save the fishery, and funds were appropriated for construction in fiscal year 1955.

In Opinion No. 257 adopted July 29, 1953, the Federal Power Commission denied the application of the Namekagon Hydro Company for a license to construct a dam on the Namekagon River in Wisconsin. The denial was based on the Commission's finding that "The proposed project is not best adapted for beneficial public uses of the Namekagon River, including the use of the stream for recreational purposes." The Fish and Wildlife Service, the Department of the Interior, and the Wisconsin Conservation Commission opposed the project because of the detrimental effects it would have on recreation, including the unique float fishing for smallmouth black bass, and on the scenic beauty of the stream.

The number of major power projects to be investigated by the Service rose sharply during the fiscal year. Some of these proposals are

large and complex, with great potential impact on salmon, trout, and big-game resources. Among these are Bruce's Eddy and Penny Cliffs on the Clearwater River of Idaho, Rocky Reach and Wells on the Columbia River in Washington, several sites on the Wenatchee River in Washington, and three sites in and adjacent to Hells Canyon on the Snake River in Idaho and Oregon. These projects are being given continued study with a view to preservation of the highly valuable fish and wildlife resources.

Service biologists kept abreast of reclamation activities affecting marshes, swamps, and seasonally flooded lands throughout the country by drainage, channel improvement, and flood-control programs. Loss of these wetland areas so essential as living space for waterfowl and other wildlife continued, and efforts were strengthened to induce Federal agencies to recognize and protect waterfowl values on such lands involved in the conduct of their programs. Special studies of the effect of agricultural drainage on waterfowl production in the prairie pothole region of the North Central States were completed. A report was sent to the Secretary of Agriculture recommending joint consideration of our findings in order to formulate policies giving greater protection to waterfowl wetlands. Action by the Department of Agriculture on this recommendation has not been completed.

A nationwide inventory of wetlands subject to drainage was completed on June 30, 1954. Included in it are about 65 million acres representing better than 90 percent of all such areas important to waterfowl. These areas are shown on county and State maps, classified by water conditions and native vegetation, and evaluated from the standpoint of their usefulness to waterfowl. The inventory will show other agencies where waterfowl values deserve special protection, and will serve as a basic guide for deciding where and how much wetland habitat should be set aside and managed for waterfowl.

## MAINTAINING THE INLAND FISHERIES

More than 17.6 million angling licenses were sold in the 48 States in fiscal year 1953. This indicates the very great interest in the sport of fresh-water fishing which results in tremendous pressure on game-fish populations. In close cooperation with the various State fish and game departments, the Service provides fish for restocking inland waters and furnishes initial stocks of fish for thousands of farm fishponds.

The Service operated 97 fish-cultural stations in 1954. As demands for fish for stocking shift from one area to another, fish production must be shifted, and this results from time to time in discontinuance of operations at some hatcheries and increased activities at others. Management studies have shown the need, at many hatcheries, for

species other than those formerly produced. Facilities must be modernized and expanded to produce the large numbers of legal-sized fish that are now required. Congress provided funds for continuing an improvement program at the Hebron, Ohio, station and for continuing the construction of new units at Frankfort, Ky., and North Attleboro, Mass., as well as for repairing flood damage at the Craig Brook, Maine, station.

Since pioneer days, the salmon resource has been important to the economy of the Pacific Northwest and Alaska. Maintenance of this renewable resource has become increasingly difficult because of population increases and industrial development. Hydropower, irrigation, and flood-control dams have impaired the salmon populations; and construction of many more dams proposed, particularly in the Columbia River, will result in further damage to the resource. To counteract the anticipated damage so far as possible, the Fish and Wildlife Service, cooperating with the States of Oregon and Washington, undertook the maximum development of salmon productivity in the lower Columbia area. Construction phases of this program, started in 1949, are about half completed, and some beneficial results already are apparent.

As a result of the construction of Grand Coulee and Shasta Dams on the upper Columbia River and on the Sacramento River, the Service initiated projects designed to mitigate damage to the salmon resources. These programs have been very successful.

Of particular interest is the development by Service biologists, with the cooperation of Bureau of Reclamation engineers, of a new type of fish-screening device, in connection with the Delta-Mendota irrigation canal in Central Valley, Calif. It will prevent the loss of fish in the canal and can be constructed at a much lower cost than the usual device. Tremendous savings are anticipated from the installation of this device in the many existing and proposed canals that affect fish populations.

Trout fishing has continued to grow in popularity, and increased production of legal-sized trout has become necessary to maintain the fishery. The studies on trout nutrition and the training program for trout culturists conducted at the Cortland, N. Y., fish-cultural station have been important factors in producing greater numbers of trout at a lower cost, as have the expansion and improvement of facilities at a number of trout hatcheries in strategic locations where the water supply is adequate and of good quality. Trout diseases have continued to be a problem at a few hatcheries; studies have disclosed the effectiveness of several new drugs in controlling these diseases.

The Service program of assistance to Defense and Veterans Administration installations has developed rapidly during the year. Fish-



ery-management biologists assisted more than a dozen VA hospitals, bringing the total number of these installations contacted to about 140 (almost all of those active). Continuing fishery-management programs are in effect at about a third of the establishments. In the past year, 10 Air Force bases and 30 Army establishments received assistance, and other military areas are included in 9 continuing programs; cooperative assistance to Navy, Marine, and Coast Guard installations lagged by comparison, but 15 of these were brought into the program. Increase in the number of requests for fishery-management assistance indicates a growing interest in this program.

Fishery-management assistance has been given to some 20 Indian Reservations, where cooperation with tribal councils is expected to result in greatly improved conservation practices. Several Fish and Wildlife Service Refuges were added in the past year to the 20 that previously received continuing aid in fishery management. An intensive pilot program directed toward comprehensive management planning for the development of lake and stream fisheries is being conducted on the Green Mountain National Forest in Vermont.

The dissemination of information on farm-pond management is being stressed, through cooperation with Department of Agriculture field agents, lectures, demonstrations, correspondence, literature, and related extension activities.

Better techniques in fishpond management are greatly needed. Service fishery-management biologists cooperate closely with State conservation departments and other research units in developing new management techniques. A number of ponds at the Hebron, Ohio, warm-water hatchery have been made available for study of pond stocking and management techniques, by personnel of the State of Ohio; a Service biologist at Hebron is conducting complementary field trials of stocking formulas in many farm ponds in the State.

In table 3 is a summary of production by Federal hatcheries for calendar year 1953. Table 4 shows land acquisition for Federal hatcheries in fiscal year 1954.

## ADMINISTRATION OF ALASKA FISHERIES

### *Management of the Commercial Fisheries*

The commercial fisheries of Alaska, under regulatory control and protection of the Fish and Wildlife Service, saw a step-up in patrol and in numbers of stream guards.

Fishery-conservation activities during the calendar year 1953 were administered by 33 fishery-management biologists and enforcement agents, 9 game-management agents detailed from the States, 150 stream guards and patrolmen, 12 seasonal employees of the Alaska Depart-

TABLE 3.—*Fishes and fish eggs distributed, calendar year 1953*

	Eggs (number)	Fry (number)	Fingerlings		Fish 6 inches or larger		Total weight, finger- lings and larger	Total number, fish and fish eggs
			Number	Weight	Number	Weight		
Largemouth bass.....		591,560	11,300,940	<i>Pounds</i> 30,205	10,295	<i>Pounds</i> 1,503	<i>Pounds</i> 31,708	11,902,795
Smallmouth bass.....		483,000	97,320	313	100	225	538	580,420
Bluegill.....			36,921,285	55,589	8,575	1,353	56,942	36,929,860
Redear sunfish.....			650,840	1,321	1,330	105	1,426	652,170
Black crappie.....			350	7			7	350
White crappie.....						120	120	815
Channel catfish.....		156,000	272,815	2,140	14,510	619	2,759	443,325
Bullhead.....			349,595	2,312			2,312	349,595
Yellow perch.....			1,750	12			12	1,750
Walleye.....		3,396,500	694,450	749	305	62	811	4,091,255
Northern pike.....		4,090,000	206,760	877	520	52	929	4,297,280
Cutthroat trout.....			2,333,600	9,820	66,510	9,114	18,934	10,242,525
Rainbow trout.....	7,469,415	373,000	6,796,590	86,178	2,033,195	326,968	413,146	18,093,025
Kamloops trout.....	9,183,240	80,000		51,780	2,420		2,420	51,780
Bearslay trout.....				15,865	198	1,535	781	17,400
Steelhead trout.....			116,815	2,341	78,485	9,339	11,680	195,300
Lake trout.....			572,635	6,934	8,890	1,072	8,006	581,525
Brook trout.....	5,926,780		3,197,105	31,137	674,930	142,925	174,062	9,798,815
Brown trout.....	3,773,325	225,000	1,305,885	15,443	454,365	109,021	124,464	5,758,575
Grayling.....	1,708,910		10,525	276			276	1,719,435
Chum salmon.....		4,650,760	202,685	346			346	4,853,445
Silver salmon.....	4,340		893,875	16,283	90,005	6,018	22,301	1,88,220
Red salmon.....	1,470,715		1,434,565	10,895	32,690	2,040	12,935	2,937,970
Kokane.....		7,204,200	190,000	48			48	7,394,200
King salmon.....	11,785,315	11,658,645	81,600,175	282,687			282,687	105,044,135
Atlantic salmon.....		91,435	185,280	4,059	4,370	406	4,465	281,085
Sebago salmon.....		25,435			17,500	537	537	42,935
Total.....	41,322,040	33,025,535	149,403,485	562,590	3,498,925	612,062	1,174,652	227,249,985

ment of Fisheries, and 68 fishery aids. A fleet of 6 vessels, 23 boats, and 155 outboard skiffs provided transportation, and 11 airplanes logged 2,800 hours of flight time.

There were 109 cases of violation of the Alaska fishery laws, and 220 individuals and 2 companies were prosecuted. Defendants in 90 cases were found guilty, 7 were acquitted, and 12 were dismissed. Fines totaling \$25,911 were levied against the operators of 31 purse seines, 50 gill nets, 3 beach seines, 5 traps, 1 troller, 2 hand rods, 11 snag hooks,

TABLE 4.—*Land acquired or in process of acquisition for fish-cultural stations, fiscal year 1954*

[In acres]

State and station	Acquired			Pending title conveyance
	By other than purchase	By pur- chase	Total	
Georgia: Warm Springs.....				1
Mississippi: Lyman.....		30	30	
Nebraska: Crawford.....				1
Oregon: Eagle Creek.....		126	126	
Tennessee: Erwin.....		1	1	
Washington:				
Carson.....	220		220	
Spring Creek.....				6
Total.....	220	157	377	8

3 spears, and 2 guns; of these, fines totaling \$5,110 were suspended. In addition, 4,055 days of jail sentences were imposed, of which all but 85 days were suspended. Sales of confiscated fish netted \$4,547.69.

In 1953, 24 weirs were operated to determine the timing and volume of salmon runs, or 7 more than in 1952; 10 were in southeastern Alaska, 9 in central Alaska, and 5 in western Alaska. The success of spawning survival was again measured by downstream-migrant sampling weirs.

### *Pribilof Islands Fur-Seal Industry*

During 1953, 66,669 fur-seal skins were taken on the Pribilof Islands, as compared with 63,922 for 1952. Under the terms of the Provisional Fur-Seal Agreement of 1942, the Canadian Government received 13,334 sealskins, or 20 percent of the season's take. The byproducts plant on St. Paul Island produced 353 tons of fur-seal meal, 31,620 gallons of blubber oil, and 15,180 gallons of carcass oil, which sold for the gross sum of \$50,974.25.

Two public auctions of fur-seal skins were held at St. Louis, Mo., during the fiscal year 1954. On October 5, 1953, sale of 27,113 skins brought \$1,944,920. On April 12, 1954, sale of 25,038 skins brought \$2,301,646; at the same time, 39 Pribilof Islands blue-fox skins sold for \$291.50. In addition, a few sealskins were sold during the year for promotional purposes.

## UTILIZING THE COMMERCIAL FISHERY RESOURCES

The commercial catch of fish and shellfish for the United States, including Alaska, in the calendar year 1953 was about 4.4 billion pounds and was valued at about 345 million dollars.

New beds of deep-water red shrimp in the Gulf of Mexico were discovered by the exploratory-fishing vessel *Oregon*. These now appear almost certain to become of commercial importance. The *Oregon* also made an important discovery of yellowfin tuna in the western gulf. Exploratory cruises are planned to determine whether the yellowfin resource would support a new commercial fishery.

More bluefin-tuna exploration in the Gulf of Maine and adjacent waters off New England indicated the possibility of establishing an annual fishery for this species. A cooperative test of bluefin fishing on a commercial scale by a tuna seiner from the Pacific coast is planned for the summer of 1954.

In Alaska, the vessel *John N. Cobb* explored new winter fishing grounds for herring, bottom fish, and shellfish in the Prince William Sound area. Exploration of the same grounds in the summer of 1954



will provide a seasonal picture of the potential available fisheries that can be developed locally.

Preliminary extensive experiments in midwater trawling were completed. New data on noises produced by fish and shrimp were revealed by underwater-listening experiments—part of the program of electronics research on methods of fish detection.

An economic study of the freezing-fish-at-sea process indicates that the method is commercially feasible. This process, designed primarily to improve the quality of domestic fish fillets, involves freezing whole fish aboard ship for later thawing, filleting, and refreezing ashore. Application to species of fish other than haddock, such as ocean perch, cod, hake, whiting, and pollock, is planned.

Fish meals and solubles were analyzed for proximate composition and content of the various B vitamins to determine the nutritive value of these products for feeding farm animals and poultry. These data will be integrated with information obtained by further research, to develop a chemical index for the feeding value of fishery byproducts.

Substantial industry interest was expressed in the development of voluntary Federal grade standards for fishery products. Grade standards raise the general quality of food products offered to consumers and assist in efficient marketing. Suggested standards for haddock fillets have been prepared. Studies were instituted and are being continued on standards for canned Maine sardines and frozen fish sticks.

Home economists of the Service in cooperation with 9 States conducted 123 fish-cookery demonstrations for school lunchroom personnel; 12 for homemakers, institutional managers, and educational groups; and a small number at "workshops" held at summer-school sessions and at other special meetings. Increases of up to 80 percent in the use of fishery products in school lunchrooms are attributed to this program.

Continued emphasis was placed upon stimulating the sale and distribution of frozen fishery products through locker plants.

Monthly and quarterly analyses of the fishery-supply situation were prepared for restaurants, food chains, associations, and Government agencies. A monthly technical abstracting service on commercial fisheries was continued.

Service-produced fishery educational motion pictures were distributed through 60 film libraries. A shrimp-fishery motion picture is in final stages of completion, and negotiations have been completed for an educational motion picture depicting the use of outboard motors in the commercial fisheries.

Assistance was given to public and private groups concerned with the development of markets for new products or for species of fish not being fully utilized.

On the authority vested in the Department by the Fishery Cooperative Marketing Act of 1934, regulatory activities and reports concerning fishery cooperative-marketing associations were continued. As of June 30, 1954, there were 81 active fishery cooperative-marketing associations in the United States and Alaska as compared with 73 a year earlier.

Information on fishery marketing, transportation, and international trade problems was assembled. Fish consumption, increased charges for icing carload shipments of fresh and frozen fish, and imports of groundfish fillets were just a few of the subjects in these fields.

A detailed summary of economic aspects of the scallop industry was made. A survey of fishery marine insurance was begun in an effort to analyze industry insurance problems.

General statistical surveys for 1952 data were completed for all sections of the United States except the Mississippi River and its tributaries. Similar surveys for 1953 data were begun.

Monthly and annual bulletins on the landings of fishery products in Maine, at principal Massachusetts ports, and Florida, and monthly bulletins on landings in New Jersey, Mississippi, and Texas were continued. Issuance of a monthly bulletin on landings in Alabama was resumed after a lapse of more than 2 years, and publication of a monthly report on landings in the marine district of New York was begun. Monthly bulletins were released on domestic freezings and holdings of fishery products, the production of fish meal and oil, documentation of fishing vessels, and United States foreign trade in fishery products.

Since the production of fish sticks is creating a new extensive market for fish, surveys were conducted to determine the growth of the fish-stick industry in 1953 and the first quarter of 1954.

Responsibility was assumed for certification of legal ottertrawl cod ends used in the New England groundfish fishery, in accordance with the regulations adopted under the provisions of the International Convention for the Northwest Atlantic Fisheries, and for conducting a study of the changes in mesh size in cod ends.

Operation of seven Fishery Market News Service field offices at Boston, New York City, Hampton (Va.), New Orleans, San Pedro, Seattle, and Chicago was continued. Because of the phenomenal development of the fish-stick industry, additional coverage of prices for processed fishery products in consumer-size packages was started. Current production and marketing information on fishery products was collected and compiled by full-time and part-time marketing specialists in fishing and distribution centers throughout the country and Alaska. Fishery Market News information was used extensively by all phases of the fishery industries and in a number of Tariff Com-

mission and congressional hearings. The field offices aided Selective Service in recommendations for occupational deferment of men employed in the fisheries.

The monthly *Commercial Fisheries Review* featured articles on the fisheries, news of trends and developments in domestic and foreign fishery industries, and Government orders affecting fisheries. The demand for this magazine increased considerably to a total of almost 4,000 subscribers.

## CONTROLLING DAMAGE BY ANIMALS

Predators and rodents seldom interfere with man's interest in a wilderness habitat, and serve a purpose as members of the plant and animal communities. The situation is quite different when such animals live in close proximity to cultivated crops, livestock, and other resources developed for human needs. Then, they compete with man for products of the soil. When they become too numerous and cause severe economic losses, local control becomes necessary.

Desired reductions of mammals or birds can often be accomplished by making changes in farming practices to affect their two basic requirements—food and shelter. Where such practices prove to be inadequate or impractical, more drastic measures must be employed, including the use of repellents, scare devices, traps, and lethal materials. The development and careful application of these management tools is a long-established practice of the Service and grows in importance as the demands of civilization increase.

### *Predator-Control Activities*

During the year, predatory-animal control activities were carried out by the Service in cooperation with 16 Western States and Alaska. In practically all cases of losses to livestock, poultry, and game by wolves, coyotes, mountain lions, bobcats, and bears, such depredations were greatly reduced by the prompt action of Service and cooperative hunters.

A statement by a Wyoming county official indicates the benefits derived from these control activities: "The longest single step we have taken \* \* \* in the last 10 years is the practice of pasture grazing. By this method, we have cut the cost of producing wool and lamb considerably. To make this practice practicable, the control of predatory animals is absolute necessary. \* \* \* This program has been very effective and, in my estimation, has been largely responsible for keeping the wool-growing industry from disappearing from this county. \* \* \* The antelope and the deer have increased threefold since the coyote has stopped taking the toll from the fawns."



Approximately 4.1 million cattle and sheep graze on western forests, and some 20,000 permittees annually pay more than 4 million dollars in fees to land-management agencies. Protection of this livestock from predatory animals is an important phase of the Service's control operations. The effectiveness of the work on the Fish Lake National Forest in Utah, for example, is illustrated by data furnished by the forest supervisor for the calendar year 1953, when a loss of only 135 sheep was reported, as compared with a loss of 4,045 sheep in 1946. Savings of forage by open herding of sheep and labor savings during that period were also appreciable.

Somewhat similar control work was carried out in Alaska to prevent serious loss of big-game animals, particularly caribou and reindeer. While these losses are usually not critical among large, well-established herds of big game, they are a deciding factor in survival among herds that have been depleted to a point approaching extermination. Such a situation was illustrated in the Escholtz Bay reindeer herd on the Seward Peninsula. A pack of 7 wolves killed at least 100 deer from this herd between October 1 and November 20; they did not kill poor animals but preferred the fat females. Further losses were prevented by control measures.

Rabies incidence in wildlife continued high, with a consequent loss of hundreds of domestic animals. In 1953, 1,475 laboratory-proven cases of rabies were reported by the various States (mostly east of the 100th meridian), with Texas alone reporting 204. Foxes and skunks were the main carriers. Reported cases of rabies in domestic stock for 1953 totaled 1,122, with a grand total of 4,945 for the 5-year period 1949-53. Reported cases probably represent less than 10 percent of the actual incidence; hence, the disease loss to farmers has been tremendous. Suppressive measures were recommended and demonstrated to the public to the limit of the Service's resources.

Coyotes were controlled in sparsely settled western range areas through use of compound-1080 stations and "coyote getters," and in thickly populated communities by traps, "coyote calls," and den hunting. Bobcats continued to increase and required intensified trapping in several States. In western Washington and northwestern California, control operations were carried out on bears which severely damaged young redwood, fir, and other valuable trees. Assistance was given to many Western States where occasional livestock losses by individual stock-killing bears were encountered, and to an Eastern State in reducing bear numbers around State-park campsites.

### *Rodent-Control Activities*

Few commodities used in the average home are unaffected by rats and mice, and these two rodents, without doubt, cause greater damage

than do all other forms of wildlife. During the year, the Service and local agencies carried out numerous programs to control these pests. Data from many areas revealed rodent filth in practically every major commodity raised for food. Contrary to popular belief, rats were not always the prime offender; for instance, there were indications that house and field mice caused more contamination in wheat. Examination of grain taken directly from combines in harvest fields disclosed mouse droppings in an appreciable percentage of samples. A survey by the Food and Drug Administration gave evidence of rodent filth in 90 percent of over 1,000 samples of corn taken at terminal markets; much of this filth originates in the huge stocks of agricultural commodities held in storage on farms and in country elevators. Such raw grain must be protected from these rodents if the Nation is to have filth-free materials for the manufacture of its food.

Work was also conducted on controlling field rodents. Much of this concerned pine and meadow mice, which damage roots and trunks of fruit trees in the Northeast, Midwest, and Pacific Northwest. The white-footed mouse continued to handicap reforestation programs, especially in Oregon and Washington. Direct control operations against these mice have been carried out on over 241,000 acres of cut-over and burned-over land in Oregon since 1950. In addition to limited use of compound 1080, the new repellent poison "tetramine" was employed with promising results. Destructive rodents of lesser importance in such areas included porcupines and pocket gophers. The small brush rabbit of western Oregon proved a serious threat to Douglas-fir plantations. In one nursery, some 250,000 seedlings suffered about 30-percent damage within 1 month. Increased efforts to prevent such losses were directed toward use of repellent substances.

The anticoagulant poisons, warfarin and pival, were used extensively in commensal-rodent control operations. A combination of cereal and water baits containing these materials proved effective for destroying large numbers of rats and mice under many types of conditions. An estimated 3½ million rats are born each day in the United States, however, and it is fallacy to place sole reliance on poisons to control rats and mice. Successful control must include basic management practices that limit their food and shelter; sanitation and rat-proofing of buildings continue to be necessary.

### *Summary*

Cooperative predator and rodent control operations during the year entailed expenditures of \$929,000 from regular departmental appropriations, supplements by \$1,288,196 from cooperating States and \$3,129,952 from cooperating counties, livestock associations, and others. The recorded catch of predatory animals by Service and cooperative

personnel was 52,636 coyotes, 1,682 wolves, 19,559 bobcats and lynxes, 860 stock-killing bears, and 232 mountain lions. In rodent-control operations, 9,246,674 acres of land were treated for elimination of prairie dogs, ground squirrels, pocket gophers, jackrabbits, field mice, cotton rats, kangaroo rats, porcupines, woodchucks, and moles. In addition, 383,499 premises were treated in cooperative campaigns for the control of rats. Special equipment and supplies used in both predator and rodent control, and 284,987 pounds of rodent-bait materials, were distributed by the Service's supply depot at Pocatello, Idaho.

## INTERNATIONAL COÖPERATION IN CONSERVATION

The problem of producing more and better food for a rapidly expanding population is worldwide. Many countries have had an inadequate diet for a long time, and their outlook for the future is questionable. Marine products are important elements in improving the dietary because they are rich in proteins, vitamins, and minerals. If marine resources are to make their maximum contribution to meeting future needs, steps must be taken to (1) maintain them at the highest level of productivity, and (2) improve the methods of capture, preservation, transport, and marketing. The United States is helping to solve this problem in two ways, through international conservation agreements and through international technical cooperation.

### *International Conservation Agreements*

During the fiscal year 1954, the Service participated in the activities of several international fishery commissions.

The International North Pacific Fisheries Commission, established by the International Convention for the High Seas Fisheries of the North Pacific Ocean, signed in Tokyo on May 9, 1952, held its first meeting in Washington in February 1954. The Director of the Service is one of the four United States Commissioners. Although the first meeting was organizational in nature, the Commission made notable progress toward the development of research programs for the convention area. The Commission's Standing Committee on Research and Biology met in Tokyo in May 1954; scientists of the Service attended the meeting.

The International Commission for the Northwest Atlantic Fisheries held its fourth annual meeting in Halifax, Nova Scotia, in June 1954. An Assistant Director of the Service is one of the three United States Commissioners. Of first importance during the meeting was a review of research during the last year under the comprehensive research



program for the convention area. Significant progress has been made in hydrography, and in research on redfish and haddock.

The International Pacific Salmon Fisheries Commission met twice during the year, continuing its work on the restoration of the sockeye-salmon runs of the Fraser River. Rapidly increasing runs have made it possible for the Commission to extend the open season on sockeye salmon during the 1954 season. An Assistant Director of the Service is one of the four United States Commissioners.

The Inter-American Tropical Tuna Commission continued its research on the tunas of the eastern tropical Pacific Ocean. Panama adhered to the convention on September 21, 1953, and thus became a member of the Commission. The Director of the Service is one of the four United States Commissioners.

The new International Pacific Halibut Convention, signed on March 2, 1953, was ratified and entered into force on October 28, 1953. An officer of the Service is one of three United States Commissioners on the Commission established by this convention. It is expected that the additional regulatory powers granted the Commission will result in an increased catch of 1,000,000 pounds during the 1954 season.

The Indo-Pacific Fishery Council held its fifth annual meeting in Bangkok in January 1954. An officer of the Service was United States delegate to this meeting. The Council continues to make progress in the development of the fisheries of the Indo-Pacific area and in the exchange of information among the 15 member governments.

The International Whaling Commission did not meet during the fiscal year, but the annual meeting of 1954 is scheduled for July in Tokyo.

### *International Technical Cooperation*

The Fish and Wildlife Service continued to assist in carrying out the program of technical assistance to friendly foreign nations by cooperating closely with the Foreign Operations Administration. During fiscal year 1954, technicians were engaged in fishery-development projects in Mexico, El Salvador, Ecuador, Peru, Liberia, Egypt, Iran, Pakistan, India, and Indonesia, and a preliminary study was made of trout waters in Panama.

In Mexico, a great shrimp fishery has developed in the past decade, providing a new and large source of food and of income to the fishermen. The resource has been exploited so heavily that conservation is already a serious problem. There is need for increased production and improved distribution of fish for domestic consumption.

In El Salvador, plans are being formulated for a modern fishing industry based upon explorations and surveys made in the past 2 years. Peru has made a number of advances in administration of fish and

wildlife resources, and in providing improved facilities for the fishing industry. A fishery terminal in Lima was established to permit large-scale refrigeration and storage, thus ensuring more effective use of surplus catches.

In Liberia, numerous farm ponds have been constructed at a considerable distance from the coast, and the prospect for further development of pond fisheries is good. There has been a remarkable increase in production from the sea in Liberia, in large part as a result of the activities of fishery technicians.

In Iran and Egypt, development of the fishing industries is still in the planning stages. In the fishing industry of India, notable progress has been made in mechanizing vessels and shore facilities, in addition to general development. Attention is also being directed toward the extensive fisheries of inland waters. In Indonesia, a program of development has been carried on for the past 3 years, with some success, and plans have been prepared for a much larger program in the future.

Parallel with the demand for fishery development and industrialization has come a greater realization in many countries of the need for training of their own people. As a result, students are being sent to the United States for training in fishery science and technology in increasing numbers.

During the past fiscal year, 9 countries sent 33 participants for training in 11 different technical branches of the fisheries. Seventeen students of various branches of fishery technology came from Cuba, India, Indonesia, Iran, Pakistan, and Thailand. Seven students of fishery biology (marine and fresh water) came from China (Formosa), India, and Pakistan, and four in fish culture came from China, Iraq, and Thailand. Indonesia and Thailand sent four students of fishery administration and statistics, and one came from South Africa for studies in the management of seal resources. Training periods varied from a few months to a year and often included university studies and extensive tours of fishing-industry centers.

# National Park Service

Conrad L. Wirth, *Director*



THE National Park Service is responsible for the conservation and regulated use of the Nation's outstanding scenic, scientific and historic areas. For the past 38 years, the Service has guarded these precious resources by careful management, progressively improved operation, well-trained personnel, and by fostering public understanding and appreciation of the areas.

In the past year, as in each succeeding year since World War II, the value and usefulness of the national parks to the American people became increasingly evident. The people are the owners of these irreplaceable resources, and their growing realization of the richness of their heritage is ever more apparent as the visitor count spirals into the tens of millions. In 1953 visitors exceeded 46,000,000—an increase of 112 percent in 7 years.

Whole families go to the parks together, to camp, to play, to find in them refreshment, enjoyment and spiritual sustenance. It is a wholesome and encouraging trend. To the National Park Service it presents a challenge of great magnitude. The safeguarding of America's primeval wildernesses and significant historic sites while making them available to great numbers of people is of paramount importance.

For some years, emergency demands for funds and personnel have taken precedence and appropriations have been far short of the amounts needed for upkeep of the parks and to properly care for this heavy visitor load.

Early in the fiscal year, while organizational changes were being introduced, Secretary McKay alluded to the problem in a public speech:

We have been compelled to admit that, since the war, appropriations have not been sufficient to enable the National Park Service to provide development in proportion to the vastly increased volume of public use. We want to provide the kind of service which enables the visitor to get the maximum enjoyment from his park experience.



I believe that the reorganization of the Service now being put into effect \* \* \* is going to help it perform its varied tasks more effectively. However, I do not delude myself into thinking that the reorganization of an agency which was already functioning with a high degree of efficiency, and whose employees are widely hailed for their dedication to their work, is the whole answer.

I can only say \* \* \* that I am hopeful that the time may not be far distant when other demands on the Treasury, which have had to be given high priority, will lighten enough so that more liberal and more nearly adequate provision may be made for the needs of the National Park System.

The Congress has been sympathetic, too, and was able to brighten the picture somewhat at the beginning of the new fiscal year by a special fund allotment for additional seasonal personnel for the summer of 1954. Some alleviation of the critical road-deterioration problem was also in view as the year ended, with provision in the 1954 Federal Aid Highway Act for additional construction funds.

However, in the nearly 9 years since the end of World War II there has been almost no provision of additional facilities to meet the vast increase in number of visitors. The tremendous backlog of roads and trails, and buildings and utilities projects, remains little changed; it has, in fact, grown rather than decreased. Facilities as a whole are so inadequate, and largely obsolescent, as to have caused a large volume of comment from magazines and newspapers during the year.

In many of its activities, the Service achieved substantial progress during the 1954 fiscal year. The land acquisition program moved forward with the help of State and private sources, some 93,000 acres of nationally significant lands were added to round out authorized park boundaries. A new area, historic Fort Vancouver, became a full-fledged national monument; another, George Washington Carver National Monument, was dedicated in honor of a great American.

Through the beneficence of public-spirited citizens and organizations, the Service was enriched by some \$454,000 for specific park purposes and a great amount in lands, properties, and historic artifacts. A donation in excess of \$209,000 from the General Federation of Women's Clubs for furnishings at Independence Hall; of \$82,000 from the Old Dominion Foundation for land acquisition at Wright Brothers National Memorial and \$25,000 from the same source for a Cape Hatteras research study; \$10,000 from Moses H. Cone Memorial Hospital for the Moses H. Cone Memorial Park—these examples could be multiplied. The famous Fuller arms collection, appraised at \$250,000, was donated and installed at Chickamauga; John D. Rockefeller, Jr., was about to add \$500,000 for land acquisitions to previous contributions.

Excellent progress was made in utilizing commercial facilities as substitutes for park-operated utilities with improved service and substantial savings achieved. Park visitor-fees were adjusted in line with higher costs to bring additional revenue. And a major highlight

was the progress in encouraging private capital investment in improving and increasing public accommodations for park visitors; millions of dollars in private capital was thus being invested by the end of the year, adding appreciably to the facilities needed so acutely both for today and tomorrow.

## REORGANIZATION

One of the major results of a study, during 1953, of the organization and functioning of the National Park Service, by a Management Study Committee appointed by the Secretary, was a reorganization of both the Washington office and regional offices, establishment of two branch offices for design and construction, and the delegation of a much greater degree of administrative responsibility to those in charge of field areas. One recommendation, growing out of the findings of the committee, which would have increased the number of regional offices to 6 from the present 4 has had to be deferred because of a mandate of the two appropriations committees of Congress that limited the use of general administrative funds to the Washington office and the existing regional offices. The committees also asked that the Department study the possible desirability of abolishing the Region 1 office and transferring its functions to Washington.

In the Washington office, the changes resulted in a reorganization providing for 2, rather than 3, assistant directors. The assistant director in charge of administration supervises the branches of finance, office services, personnel and safety. The assistant director in charge of operations supervises the branches of concessions management, lands, forestry, a new branch of programs and plans control and a new maintenance section. The chief of the Audit Branch is made directly answerable to the director, and the staff of the chief counsel has been transferred to the Officer of the Solicitor.

In addition to the previously existing Division of Design and Construction, two new divisions have been established. Interpretation includes the branches of history, information, natural history, and museums. A new Division of Cooperative Activities includes the branches of area investigations, river-basin studies, and State cooperation. Also directly under the director is a new assistant concerned principally with management improvement.

All the detailed functions of design and construction are now centered in two branch offices of design and construction, in Philadelphia and San Francisco, which began functioning on June 1. The four regional offices, with their reduced staffs, have been delegated much of the authority formerly exercised by the director, and most of this has, in turn, been redelegated to those in charge of field areas, in varying degrees, depending largely on the adequacy of area staffs. A

number of technicians, formerly on regional office staffs, have been transferred to field areas where, as a rule, they serve two or more areas.

## TRAVEL IN PARK AREAS

The dynamic growth of our population is reflected in the heavy travel in park areas. The upward trend that has marked the past 7 years continued, with 46,224,794 visitors recorded in the 1953 calendar year as against 42,299,836 in 1952—an increase of nearly 4,000,000. Natchez Trace Parkway, included for the first time in the report, accounted for about one-third of the overall increase. Eleven areas attracted more than 1,000,000 visitors each. Of these, Blue Ridge Parkway recorded 4,266,975 visitors; 2 other areas had more than 2,000,000 each.

In addition to the visitors reported above, the National Capital Parks, exclusive of national memorials, had a total of 6,043,386 visitors in 1953.

*Public interest in reports.*—The statistical records on park visitors collected, compiled, and maintained by the Service are being used by private enterprise at an increasing rate as sources of information. During the year, the monthly reports were distributed regularly on requests to business and trade organizations, advertising agencies, public libraries, universities, newspapers, magazines and individuals.

*Travel surveys.*—Progress continued on the travel surveys of national parks started some years ago to obtain much needed information on travel habits and expenditures of park visitors. The findings provide data that are of assistance to the Service in managing and developing the parks and in evaluating economic benefits derived therefrom. The Bureau of Public Roads and State highway departments cooperate with the Service by conducting the surveys, with the assistance of park personnel. Such surveys have been completed for 4 national parks and 3 more are in various stages of completion. The Virginia Highway Department prepared a report, now being published, on findings in the Shenandoah National Park survey, field work for which was completed in fiscal 1953. Field work on the Yosemite National Park survey, in which the California Division of Highways participated, was finished in October 1953. The data obtained were being analyzed, to be followed by preparation of the report. The newest survey, of Grand Canyon National Park, was initiated last February, and field work was scheduled for completion in October 1954. The Arizona Highway Department is participating in this survey. An interim report on the sampling of winter use was released, and will be followed by those on other seasons as work progresses.

*Distinguished park visitors.*—President Eisenhower visited Abraham Lincoln National Historical Park on April 23, toured the park



and gave a brief speech. King Paul and Queen Fredrika of Greece visited Muir Woods National Monument, Calif., Grand Canyon National Park, Ariz., and the Home of Franklin D. Roosevelt in November 1953. The latter was also visited by President José Antonio Renón of Panamá, Emperor Haile Selassie of Ethiopia, and Crown Prince Aitihi of Japan. President Celal Bayar of the Republic of Turkey was a visitor at Lake Mead National Recreation Area.

*Safeguarding the visitor.*—Efforts were increased during the year to insure greater visitor safety in the park areas through careful planning, training of personnel and cooperation from the Red Cross, Public Health Service, and other agencies. Also, efforts to increase visitor safety-consciousness were continued by rangers, naturalists, and other field personnel through both printed and spoken warnings against possible hazards. There was a slight increase in visitor fatalities, from a rate of 1.04 per million visitors in the 1952 calendar year to 1.08 in 1953. Of the 50 visitor fatalities reported, 22 were from motor vehicles, 19 from drownings, 6 from falls, and 3 from other causes.

## IMPROVEMENTS IN PUBLIC ACCOMMODATIONS

A major achievement of the year was the progress made in encouraging private capital investment in public accommodations to serve the millions of park visitors. The accomplished concessioner contracts and permits represent careful and detailed study as to how the needs and demands of the visiting public can be met with encouragement and protection to the investment involved. Improvements of concessioner-operated facilities underway or planned will be of immeasurable help in providing for greater public enjoyment of national park areas.

*Contracts.*—The Service entered into 16 new concession contracts and 8 extensions of existing contracts. Of the new contracts, 3 were fully executed; 2 were under review by the Congress in accordance with requirements of the act of Congress of July 31, 1953, and 11 were being processed for transmittal to the Congress. Six of the 8 extensions were fully executed, one was before the Congress and one was being readied for transmittal. Forty-five concession permits were handled of which 34 were completed, one was under review by the Congress, and 10 were in process for review. Ten subconcession agreements covering a wide variety of incidental services were approved.

*Construction and improvement of facilities.*—At Grand Teton National Park, where travel had increased 509 percent over 1946, the Grand Teton Lodge & Transportation Co. launched a program for development of public facilities which is expected to involve an investment in excess of \$5,000,000. Here construction of a three-story

main lodge and 256 cabins at Jackson Lake had progressed to the point where 150 cabins were opened to the public on June 13, 1954, months ahead of schedule. The lodge, remaining cabins, stores, cafeteria, service stations and other facilities are expected to be completed for use in time for the 1955 travel season. In the Colter Bay area, the company will place some 200 log cabins, a 112-site trailer area, commercial-service buildings and employee residences. The Service was developing the 229-site campground, providing roads and parking areas, and installing a utility system for the park areas.

In another concessioner development, at Yosemite National Park, the Yosemite Park & Curry Co., built a new store and grill and reconstructed Big Trees Lodge at Wawona and was anticipating construction of new accommodations in the Yosemite Village area. Hamilton Stores, Inc., has agreed to spend some \$600,000 in improving its public facilities in Yellowstone National Park; the Mesa Verde Co. agreed to provide additional housing for visitors at Mesa Verde National Park; and Almours Securities, Inc., will improve facilities on the George Washington Memorial Parkway at Mount Vernon.

At Lake Mead National Recreation Area, concessioner improvements made during the year include the Anderson Brothers' 150-unit trailer court at Boulder Beach; 6 new cabins, a shop and other facilities at Temple Bar; a 60-unit trailer court and 8-room motel by Mohave Resorts Co. at Katherine; and an 8-room employees' dormitory at Lake Mead Lodge. The long-standing boat transportation problem of the Statue of Liberty National Monument has been resolved with the awarding of a concessioner contract to the Circle Line-Statue Ferry, Inc., which has placed two new boats in operation. In Hawaii National Park, the concessioner completed an addition to Volcano House; an inn and cabins were completed on Ocean Strip, Olympic National Park; and bungalow units and service station at Lassen Volcanic National Park.

While these improvements are welcome, it must be pointed out that they meet only a small fraction of the need for improvements and additions to care for the great increase in number of visitors.

## USE OF COMMERCIAL UTILITY SERVICES

Substantial progress was made in the program of utilizing commercial facilities in park areas as substitutes for locally-operated utilities. Improved service and reduced costs have resulted, particularly in the electric power and communications fields.

At Grand Canyon National Park, where the Arizona Public Service Co. contracted to supply electricity, service will be improved and annual savings of \$20,000 have been estimated. Western Engineering Co. has contracted to take over maintenance of all radio communica-

tions in Glacier National Park at an estimated saving of \$8,000 a year. Here also, contracts have been negotiated with the Flathead Electric Corp. and the Glacier County Electric Cooperatives to furnish electric service to various areas. At Big Bend National Park, the Rio Grande Electric Cooperative, Inc., with an allotment of REA funds, brought in electric power to the principal developed areas, resulting in elimination of 10 power-generating units in the park.

Electrical service by the Salt River water users power district at Tonto National Monument, introduced during the year, has eliminated use of small electric powerplants, reduced expense and improved service. Arches National Monument has contracted with the Utah Power & Light Co., for electric power and the use of propane gas will be eliminated. Use of Arizona Public Service gas at Southwestern National Monuments headquarters eliminated propane gas and reduced costs one-third in the first 7 months.

In Grand Teton National Park, a contract for construction of a powerline from the south boundary of the park to Jackson Lake Lodge and Colter Bay, together with spur lines serving other developed park areas, was awarded by the REA to Alpha Construction Co. on May 28. The project was expected to be completed well in advance of the 1955 travel season.

The Mountain States Telephone & Telegraph Co. has taken over maintenance of the Mesa Verde National Park telephone system under contract. Negotiations were under way with the Pacific Telephone and Telegraph Co. to operate the telephone system in Sequoia and Kings Canyon National Parks and in Mount Rainier National Park. Other national parks including Zion, Bryce Canyon, Shenandoah, Mammoth Cave, and Great Smoky Mountains were in the negotiating stage for commercial telephone services. At Shiloh National Military Park, arrangements had been completed for installation of dial telephone service by the Adamsville Telephone Co.

## CONSTRUCTION PROGRESS

The outstanding development of the year pertinent to vitally needed construction projects was the contract authorization provision in the 1954 Federal Aid Highway Act signed by the President on May 6. Under this provision whereby funds authorized for park roads and trails and for parkways in the next 3 years are immediately available for contract, a total of \$35,000,000 is authorized for park road and trail construction and \$32,000,000 for parkways.

The average annual appropriation for roads and trails in the 8 post-war years has been only about \$4,000,000 in each of the 2 categories. Through the new provision, work will be almost tripled. Also it will be possible to speed up progress on the huge backlog of work, com-



pletion of which is of vital importance for the preservation of park areas and the safety of the millions of park users.

To enable the Service to implement an accelerated program in the 1955 fiscal year under the contract authorization provision, Secretary McKay requested congressional approval on June 11 of a \$5,275,000 supplemental appropriation. Of this amount, \$4,075,000 would be added to the 1955 budget estimate of \$425,000 for parkways; and \$1,200,000 to the \$3,800,000 estimate for roads and trails. A major portion of these funds will be required to meet payments for contracts awarded to private contracting firms under competitive bidding.

In the 1954 fiscal year, the \$10,376,300 in new construction funds appropriated included \$4,050,000 for buildings and utilities; \$4,010,000 for roads and trails; and \$2,316,000 for parkways. In addition, \$1,500,000 was appropriated to finance a 1952 Federal Highway Aid Act contract authorization for the Baltimore-Washington Parkway.

With the new funds and other obligated moneys from previous appropriations, the Service directed construction primarily toward provision of the most urgent public use facilities. Such work, including roads, trails, parking centers, campgrounds, buildings, passenger elevators, utility systems and related facilities necessary for administration, protection and interpretation, was accomplished to an appreciable extent. Parkway construction progressed on a limited scale on 6 of the 8 authorized parkways.

*Buildings, utilities, and grounds.*—An expansion of facilities at Grand Teton National Park was undertaken and contracts awarded for: a water supply system to the Jackson Lake Lodge and Colter Bay areas, \$331,021.10; and an electric distribution system for the Jackson Lake area, \$37,500. In Everglades National Park, work was begun on the first major public use development at Flamingo, on Florida Bay. Dredging was started there on a boat basin and other developments will include camping and picnic facilities, dock and shelter building, roads, and water and sewer systems.

At Carlsbad Caverns National Park, a \$208,619 contract has been awarded for two 25-passenger elevators and construction of the elevator house. Excavation of the elevator shaft and construction of a pit and lobby in the cavern were completed by the contractor at a cost of \$231,718.50. A project to improve electricity in the caverns is in progress. At three different locations in the cave a total of 2,500 seats have been installed to provide visitor comfort during interpretive talks.

Of special note was the construction of an addition to the Chickamauga museum to house the Fuller collection of small arms, administration and public-use buildings at Joshua Tree and Saguario

National Monuments, and utility buildings in Potomac Park, Washington, D. C., and at Death Valley National Monument. New campgrounds were developed in several areas including the first 2 at Mount McKinley National Park, Alaska, and the first 1 at Organ Pipe Cactus National Monument. At Coulee Dam National Recreation Area, 16 small campgrounds and picnic areas were developed by the rangers in their spare time with the help of donated labor from adjoining towns.

During the year, the Atchison, Topeka, and Santa Fe Railway Co. donated to the Federal Government the utility facilities it owned in Grand Canyon National Park, appraised at \$1,100,000. On March 11, 1954, the director accepted title to these facilities for the Government.

*Parkway development.*—With 1954 appropriations and carryover funds from previous years, parkway construction contracts and force account projects totaling \$9,534,834.90 were completed. These included 29.7 miles of grading, 10 bridges and grade separation structures, and 16.4 miles of paving. All major construction contracts under the \$14,500,000 authorized for the Baltimore-Washington Parkway, the high-priority defense project, were either completed or nearing completion by the end of the fiscal year. The parkway portion between Jessup Road, which joins the State of Maryland section, and the Laurel-Bowie Road, a distance of 7 miles, was opened to traffic in November 1953. Balance of the project was expected to be completed and open to traffic in October 1954.

Work continued on grading of the 4-mile gap in the Blue Ridge Parkway on sections 2U and 2V west of Asheville, N. C., to connect 2 previously graded units, and on the Tuggles Gap separation structure in Virginia. Bids were opened on June 29 for the contract to grade section 2G1, 3 miles, in the vicinity of Blowing Rock, N. C. When completed this section will provide direct access to the Moses H. Cone Memorial Park on the parkway and will enable motorists to bypass the congested resort town of Blowing Rock.

An aerial mapping survey of the Cumberland-to-Hancock section of the Chesapeake and Ohio Canal Parkway was started and, when completed, will provide topographic maps of the first unit of approximately 15 miles from Cumberland, Md., to Oldtown. Completion of the grading, stone base, and paving of 1.6 miles of the Foothills Parkway between Gatlinburg, Tenn., and Banner Bridge, has eliminated the need to use the dangerous one-way Banner Bridge across the west fork of the Little Pigeon River.

Plans were completed for the hydraulic fills on the section of Colonial Parkway between Williamsburg and Jamestown Island, Va., and this work was expected to start early in fiscal 1955. Concentrated efforts continued toward completion of the Jamestown-Wil-

liamsburg-Yorktown portion of the highway in time for the 1957 celebration of the 350th anniversary of the founding of Jamestown.

On the Natchez Trace Parkway, 2.4 miles of grading and one overpass structure in the vicinity of Tupelo, Miss., were completed. Approximately one-third of the grading on an adjoining section was completed by day labor before closing down the project due to lack of funds. The grade separation underpassing Mississippi State Highway No. 35 near Kosciusko, Miss., was also completed and opened to traffic. Grading of a 34-mile unit between Alabama Highway No. 2 and U. S. Highway No. 64 in Tennessee was completed and paving was started under contract. When finished, this will be the first major unit of the parkway to be completed in those States. The 64-mile completed section in Mississippi had close to 1.5 million visitors recorded in 1953.

*Bureau of Public Roads construction.*—Though the park roads program undertaken by the Bureau had fewer completions than previous years, the scope of the program was significant. Several outstanding road replacements and improvement projects that had accumulated over a period of years due to limited funds were started. The work of this nature under contract as of June 30, 1954, represents \$2,327,000 and applies to 44 miles of road. The total road program under contract amounted to \$4,552,224 affecting 100 miles of road.

The newly initiated projects included work on the Many Glacier and Approach Road to Glacier National Park, and resurfacing of the Going-to-the-Sun Highway; reconstruction of 3.5 miles of the Norris Canyon Cutoff Road, Yellowstone National Park; replacement of a portion of the Cedar Pass-Pinnacles Highway, Badlands National Monument; replacement of a 6.5-mile portion of the Bear Lake Road, Rocky Mountain National Park; reconstruction of the last section of the South Entrance Road, Grand Canyon National Park, supplementing work started in 1953; and a 9-mile portion of the South Approach Road to Grand Canyon National Park.

Projects completed totaled 10 miles at a cost of \$520,000 including the Katherine Spur Road, Lake Mead National Recreation Area; a 1.5 mile section of the Heart of the Hills Road, Olympic National Park; 2 surfacing projects on the Cades Cove Road, Great Smoky Mountains National Park, and 1.8 miles at the eastern terminus of the Zion-Bryce Canyon Approach Road.

*Park Service roads and trails program.*—Outstanding roads and trails projects completed under direct Service supervision include the new campground at the Old Faithful area in Yellowstone National Park; slope stabilization on roads in Shenandoah National Park, and along the Rim Road in Crater Lake National Park; the concrete sidewalks and utility yard at the Statute of Liberty National Monument;



the utilities road at Badlands National Monument; the road system for the Colter Bay development at Grand Teton National Park; the bypass road at Appomattox Court House National Historical Park; and the West Entrance Road at Big Bend National Park.

## SPECIAL STUDIES

*Sanitation studies.*—To develop economic and efficient refuse and trash disposal methods, to meet the load imposed by vastly increased visitation, negotiations have been completed with the United States Public Health Service to conduct a series of trash and refuse disposal studies during fiscal 1955 in Glacier, Yellowstone, Grand Teton, Yosemite, Shenandoah, and Great Smoky Mountains National Parks.

*Trailer accommodation study.*—The special study, initiated last year, to determine how best to meet the growing demand for modern trailer accommodations in national parks, has been completed. A handbook containing results of the study is being prepared for distribution to administrative and professional personnel.

## NATURAL HISTORY

*Interpretive activities.*—The need for more personnel in the parks, not only the protective forces but those in the naturalist field to interpret the scenic-scientific areas to the people becomes increasingly acute. As visitors continue to increase, supplementary devices—visual and self-guidance aids—are being employed effectively. Interpretive facilities and services in the 58 scenic-scientific areas served 18,901,244 people in 1953, compared with 17,143,947 for 53 areas in 1952, an increase of 10.2 percent. Emphasis on self-guidance was reflected in an increase from 9,424,984 persons served in 1952 to 11,207,740 in 1953.

Pilot studies of visitor needs and interpretive methods have been undertaken jointly by naturalist and historian staffs. Visitor interviews and a field study were conducted in May 1954 at Fort McHenry and a similar study was scheduled for early August at Acadia National Park. Other studies included one on self-guiding trails and tours, another on performance-testing of audiovisual equipment together with experimental installations in selected areas. Interpretive signs and markers were under study and improvements were being introduced. A survey of campfire circles was completed and the resultant report will serve as a guide for a servicewide campfire rehabilitation program. Plans were under way for a study aimed at bettering opportunities for visitors to observe wildlife in the parks.

*Progress in interpretive training.*—Significant progress was made in training interpretive personnel. A 5-day Visitor Service Conference in October 1953 at Shenandoah National Park conducted on a servicewide basis produced plans for improved training methods and aids. Key interpretive personnel of Region 3 attended a 4-day training course at Grand Canyon National Park in March 1954 and spent an additional day of joint training with protective personnel. In Yosemite National Park, personnel from the Pacific coast areas and the California State Parks division worked out procedures for effective area-level training at a 5-day area-level course.

Two in-service training booklets, Talks, and Conducted Trips, were published during the year and 2 other publications were nearing completion. Volume 25 of the Administrative Manual, Information and Interpretation in the Field, was revised in a streamlined edition for easier use.

*Accelerated research.*—Plans were developed for a comprehensive 2-year cooperative geological research program at Cape Hatteras National Seashore. Field work will start in the late summer of 1954 to continue through the 1956 field season. The Institute of Coastal Studies of the University of Louisiana and the Geological Survey are cooperating in this project. The survey was made possible through a private donation of \$25,000 to the Service for the purpose.

A geological, biological and archeological study of Katmai National Monument in Alaska, initiated in June 1953, was continuing into the 1955 fiscal year. Cooperators in this project included the Office of Naval Research, the Arctic Institute of North America, the United States Public Health Service, and the Geological Survey with logistic support from the Army and Air Force. When the second and somewhat limited phase began in June 1954, participants included the Geological Survey, Public Health Service, the Department of Agriculture and the University of Alaska with the Army and Air Force again providing logistic support.

The Geological Survey made important contributions to geological research in other Service areas including geologic mapping in Great Smoky Mountains National Park, Carlsbad Caverns National Park and Mesa Verde National Park. After these were completed, a study of the geology of Jackson Hole in Grand Teton National Park was initiated, and negotiations were under way for a general geological study of Yellowstone National Park.

*Wildlife studies.*—Biological studies were undertaken in Katmai on the caribou and Dall sheep range and population problems; on sheep-wolf relationships in Mount McKinley National Park; and elk herds of Northern Yellowstone, Jackson Hole, Rocky Mountain, and Olympic. At Yellowstone, 207 antelope were trapped for live shipment; 139

bison were destroyed, with carcasses distributed to Indian tribes; and approximately 1,050 elk were removed, falling far short of the desired reduction of 5,600. Reduction of the Jackson Hole elk herd by licensed hunters produced a kill of only 109 elk inside Grand Teton National Park.

*Cooperating societies.*—Three new natural history associations were authorized, at Lake Mead, Great Smoky Mountains, and Death Valley. There are now 21 cooperating societies in scenic-scientific areas.

Publications sales by the associations increased to approximately \$175,000 from approximately \$135,000 last year. There were 12 new titles published, and 51 additional titles revised or rerun. Equipment, materials, and services valued at almost \$25,000 were contributed to the Service.

## HISTORY AND ARCHEOLOGY

Visitors to the 122 historical and archeological areas of the National Park System totaled 18,325,161 during the calendar year 1953. Nearly 11,000,000 of these received guidance and help from Service personnel in the 80 areas where such contacts are recorded.

*Audiovisual aids.*—To supplement personal interpretive services, the year saw increasing use of audiovisual aids of various kinds. The most outstanding automatic synchronized tape-and-slide presentation installed during the year was Shiloh—Portrait of a Battle, a 17-minute account of the Battle of Shiloh, with musical background, offered at Shiloh National Military Park. A 20-minute recorded talk at the Gettysburg Cyclorama; a tape recorded talk given on the Statue of Liberty boat; and a tape recording with filmstrip, prepared by the staff of Independence National Historical Park in cooperation with the University of Pennsylvania Graduate School of Education, were some of the other interesting accomplishments in this important field.

*Self-guiding trails.*—A self-guiding tour route, supplemented by a self-guidance leaflet, was placed in use for the Independence Hall group of buildings at Independence National Historical Park, its use directed primarily to school groups. Use of the technique of self-guidance was extended to the main ruins at Bandelier, Tumacacori, and Navajo National Monuments, and at the Pioneer Farmstead area of Great Smoky Mountains National Park.

*Donations.*—In addition to the General Federation of Women's Clubs donation of more than \$209,000, and the gift of the Claud E. Fuller arms collection, mentioned earlier, the Service obtained also fine examples of 16th century arms and armor through two generous donations. Funds given by Representative Charles E. Bennett of Florida were used to purchase some excellent pieces of the type illus-



trated in 1,564 drawings of Fort Caroline by Le Moyne; and two very fine suits of armor were donated by Mr. C. O. V. Keinbusch of New York for use in the armory planned at San Juan National Historic Site. Two Fort Sumter flags, hauled down when the fort was evacuated in 1861 and raised there again when it was reoccupied in 1865, given by the Department of the Army, are to be placed at the fort; the flag which draped Lincoln's casket, also presented by the Army, will be displayed at the Lincoln Museum.

*Restoration, stabilization, and rehabilitation.*—The most outstanding restoration of the year was at Fort Necessity, scene of Washington's first battle. There, archeological investigation had disclosed remains of the original stockade posts still in place. This discovery settled a century-old controversy as to the original shape of the fort.

The historic stables at Hampton National Historic Site are being rehabilitated with donated funds. One is to be a period stable; the other will display period carriages and exhibits relating to the early life at Hampton. To this end, a fine early 19th century carriage is being restored, also with donated funds.

*Assistance in safeguarding our historic heritage.*—The public interest in historical conservation work continued to mount. During the year, requests for the preservation of places of historical importance were received from 119 individuals and organizations, and involved 69 different areas. Of this large total, 6 proposals were handled on behalf of the President; 50 involving 30 historic areas on behalf of Members of Congress; and 47 requests involving 33 areas were studied and considered on behalf of individuals or patriotic organizations. To the already large number of bills introduced into the Congress to promote the preservation of historic places or to establish memorials, 107 new bills were introduced relating to 25 areas or historical subjects. In addition, six bills were introduced relating to matters that pertained to established areas in the National Park System.

*Jamestown-Williamsburg-Yorktown Celebration Commission established.*—Senate Joint Resolution No. 62, approved by the President on August 13, 1953, provided for the establishment of the Jamestown-Williamsburg-Yorktown Celebration Commission to be composed of 11 members. This Commission will develop plans for the celebration, in 1957, of the 350th anniversary of the founding of the first permanent English settlement in America at Jamestown in 1607, the flowering of Colonial Virginia culture and statesmanship at Williamsburg on the eve of and during the Revolution, and the final winning of American independence at Yorktown on October 19, 1781. Toward this end, the Federal Commission, the establishment of which was completed on April 10, will cooperate with and assist the Virginia 350th Anniversary Commission established by the State of Virginia.

*Historic preservation in time of armed conflict.*—As great cultural treasures are peculiarly vulnerable in time of war under modern conditions of warfare, the Service joined with the Department of Defense, the National Archives, Library of Congress, Smithsonian Institution, and National Gallery of Art in assisting the Department of State in the preparation of the position to be taken by the Government of the United States on a proposed International Convention for the Protection of Cultural Property in the Event of Armed Conflict, the subject of an international conference at The Hague, Netherlands, April 21 to May 14, 1954. A United States Delegation was sent to The Hague Conference and it was found possible to sign the Convention on behalf of the United States. Fifty-four nations were represented at the conference. Thirty-six nations, including Russia, signed the convention.

The treaty, to be ratified by the United States Senate before it becomes law in this country, should give an additional measure of protection to historic sites, buildings, and museum objects in time of armed conflict as compared with the older rules of international warfare based on The Hague Agreements of 1899 and 1907.

*Archeological field studies.*—Outstanding discoveries in the field of archeology were made in the areas of the National Park System. At Death Valley National Monument, surveys and test excavations by the University of Southern California have uncovered a range of sites dating from beach occupation of Pleistocene Lake Manly to recent sites with historic contact material. At Aztec Ruins National Monument, excavation of the Hubbard Mound disclosed an unusual round building about 60 feet in diameter which consisted of a kiva—or ceremonial chamber—surrounded by two concentric rings of rooms. Evidence of earlier structures was found underneath the circular building.

## SALVAGE OPERATIONS

*River basin archeology.*—The Service continued to cooperate in the Interagency Archeological Salvage program in conjunction with the Smithsonian Institution and other Federal and State agencies, including universities. At Garrison Reservoir, N. Dak., rising waters in the spring of 1954 so threatened the old site of Fort Berthold that the Corps of Engineers made every effort to divert the rising waters in order to allow the archeologists as much time as possible to salvage these remains. Under contract with the Park Service, the North Dakota State Historical Society and the Smithsonian Institution each put parties in the field at the earliest possible date. The archeologists uncovered the remains of the earliest fort at this site, as well as later structures. Photographs and maps will help supplement the artifacts uncovered and give a permanent record of this important military post long after its location has disappeared under water.

At Fort Randall Reservoir, two field parties of Smithsonian scientists frantically gathered material and test excavated ancient Indian sites—often with the rising waters lapping around their feet. A cooperating institution, the University of Kansas, also excavated several sites in the Fort Randall area. In the Oahe Reservoir, the University of South Dakota carried on archeological salvage operations, uncovering material which helps to tell the story of the early Mandan and Arikara Tribes along the Missouri River.

In the Buford Reservoir, Georgia, one site yielded material which could be dated by the new radio-carbon method developed by Dr. Libby at the University of Chicago. This material indicated that the area had been inhabited by early Indians some time during the period 300 B. C. to the year A. D. 1.

In the Table Rock Reservoir area of Missouri, the University of Missouri continued its archeological salvage operations. It is this area which possibly contains the last unspoiled remains of the Ozark Bluffdwellers. Because of the excellent preservation afforded by the dry caves, many perishable artifacts of wood, fabric, and basketry have been recovered.

## MUSEUM ACTIVITIES

Several new museums were opened and many additional exhibit units were completed in the course of the year. The Service's museum laboratory installed a series of new exhibits for the small museums at Appomattox Court House National Historical Park, Mammoth Cave National Park, and Cape Hatteras National Seashore. At Fort Necessity National Battlefield Site, new exhibits were placed in the reconstructed storehouse and stockade, in time for the 200th anniversary celebration on July 3 and 4, 1954. The fine new museum wing at Chickamauga and Chattanooga National Military Park headquarters was completed. New or revised exhibit panels or displays were prepared and installed in the existing museums at Jamestown, Kings Mountain, Antietam, Vicksburg, Fredericksburg, Fort Raleigh, Whitman, Castillo de San Marcos, Natches Trace, Homestead, and George Washington Carver; and museum laboratory technicians were working on museums at Jefferson National Expansion Memorial and at San Juan National Historic Site.

*Electric orientation maps.*—Two such maps were completed and installed at Fredericksburg and Shiloh National Military Parks, and another was planned for Fort McHenry National Monument. General improvements of museum exhibits were completed at a number of other areas. In connection with the 50th anniversary of man's first flight, in December 1953, the Service opened to the public the recon-



structed and refurnished hangar and quarters used in 1903 by the Wright Brothers in their experiments at Kill Devils Hills, N. C.

*New branch laboratory.*—A new specialized branch preservation laboratory was placed in operation at Gila Pueblo, headquarters of Southwestern National Monuments. Its function is to clean, repair, number, file and catalog pottery specimens of scientific interest from Southwestern park and monument collections.

The Museum Branch designed, constructed and installed exhibits in the new State park museum at Marksville, La., by request of the State. Nine duplicate dioramas of airborne support for a beach assault were completed for the Marine Corps.

## PUBLICATIONS

Despite the great increase in number of visitors to the areas administered by the National Park Service, the amount available for the printing of informational publications has remained at \$96,500 a year for the past 4 years. The result has been to limit the quantities available for distribution to park visitors as well as to curtail the introduction of new items of sales literature.

Of the so-called free literature, 8,045,000 pieces were ordered during the year, involving the issuance of 98 requisitions. Requisitions were also issued for three new items in the slowly growing historical handbook series—Fort Necessity, Fort Laramie, and Vicksburg; for natural history handbooks for Rocky Mountain National Park and Badlands National Monument; and for Transplanting Trees and Other Woody Plants, a slightly revised item in the tree preservation series which will have a much improved format.

The enthusiastic reception accorded the Olympic National History Handbook, first item in this new series, required a second printing only 3 months after its appearance.

Eastern and Western United States maps, each showing the areas administered by the Service and with essential information about each area on the reverse side, were sent to the printers. These will be used mainly to answer inquiries, and will greatly simplify the process in the Washington office.

*The handling of inquiries.*—Through the adoption of a thoroughly streamlined processing procedure near the end of the fiscal year 1953, handling of the flood of inquiries and requests for publications has been kept reasonably current for the first time in many years.

*Cooperating society publications.*—Because of the Service's limited printing funds, officially designated cooperating societies and associations have come to play an increasingly important part in the production of needed publications since the war; in that way, they have per-

formed an invaluable service. In connection with our effort to raise the quality of these publications and those issued by the Service, we have been fortunate in obtaining the advisory services of Mr. Sidney Jacobs, in charge of production for Alfred A. Knopf, Inc.

## PROTECTING THE PARK FORESTS

Through vigilant fire-control operations and improved protection of the park forests, the Service's fire-prevention record was a creditable one in the past year. The intensive and consistent training courses for forestry personnel again proved worthwhile in preventing tremendous fire losses in several park areas. Hazardous fire weather conditions generally followed the pattern of the 1952 calendar year with critical periods in the East exceeding those of the previous two decades.

Significantly, more lightning fires were reported than during any previous year on record. Although the number of 487 fires and 14,833 acres burned in Service-administered areas exceeded those of last year, the total burned area was less than the preceding 10-year average. Severe lightning storms caused 28 fires in Yellowstone National Park and 31 in Yosemite National Park, and imposed heavy additional responsibilities on park personnel during periods of heavy visitor use. With the contributory help of neighboring protection agencies and experienced Indian fire crews flown in from Southwestern Indian reservations, the situations were all well handled.

*Tree disease control.*—White pine blister rust continued, as last year, to be the tree disease of major concern in park areas. The control program under way in 13 areas was nearing completion, with 78 percent of the control area requiring only infrequent examination. The control of dwarfmistletoe in the ponderosa pine forests of Bryce Canyon National Park, the second project of this kind undertaken in a national park, was successfully completed. Oak wilt, a deadly disease threatening the hardwood forest cover of the East, was found in a small area of Shenandoah National Park and control work was undertaken immediately. Control work continued on a similar infection in Effigy Mounds National Monument.

*Forest insects.*—The epidemic upsurge of several forest insects required expanding control programs throughout the country. Damaging infestations developed within several national park areas, requiring the close attention of park foresters. With the help of cooperating entomologists in appraising the situations, control programs were introduced in 5 of the 8 areas where significant epidemics

occurred or threatened. Included were control of lodgepole pine needle miner and mountain pine beetle in lodgepole pine, Yosemite National Park; Jeffrey pine beetle in Jeffrey pine, Lassen Volcanic National Park; Black Hills beetle in ponderosa pine, Bryce Canyon National Park; and southern pine beetle in pitch pine, Great Smoky Mountains National Park. Of special interest was the successful airdrop of supplies and equipment to a newly established mountain pine beetle-control camp at an elevation of 10,000 feet in Yosemite National Park. In other areas, maintenance control of insect attacks continued on 16 projects and were successful in keeping tree losses at a minimum.

*Grazing.*—Despite increasing pressures to open new areas for livestock grazing, reduction of grazing within the scenic and scientific park areas has been relatively successful in the past decade. The practice has been eliminated in 11 western areas that reported grazing in 1943. There has been an overall decrease of 43 percent within all western areas, and a reduction of 36 percent in servicewide grazing during that period.

## CHANGES IN THE NATIONAL PARK SYSTEM

*Fort Vancouver National Monument established.*—Secretary McKay signed an order on June 30 which finally established Fort Vancouver National Monument in Washington, authorized by Congress in 1948. The order was to become effective on publication in the Federal Register on July 9. Some 60 acres of federally owned lands were transferred to the Department through the General Services Administration for the monument site. Fort Vancouver played a significant role in the settlement and development of the Pacific Northwest. From 1825 to 1846, it was western headquarters for the Hudson's Bay Co., and the center of economic, political, social and cultural life in the Oregon country. In 1849, it became the first United States military reservation in the area. The monument site adjoins Vancouver Barracks, an active Army post.

*Contemplated additions.*—Legislation enacted by the 83d Congress authorizing establishment of Fort Union National Memorial in New Mexico was on the President's desk awaiting his signature at the end of the fiscal year. The old fort, founded in 1851 as a protector for travelers over the Sante Fe Trail and against plundering Indians, played an important part in establishing United States control in the Southwest. Its impressive ruins are still standing. A bill to authorize the City of Refuge, Territory of Hawaii, which passed the House of Representatives in the 2d session of the 83d Congress, was still in the Senate committee at the end of the fiscal year.



## LANDS AND AREA PROJECTS

*Land acquisition.*—Notable progress was made in the Service's long-range program of acquiring non-Federal lands within approved park boundaries. Some 92,750 acres were brought into the National Park System by purchase, exchange or donation or were about to be acquired at the end of the fiscal year.

By a secretarial order of March 12, Everglades National Park boundaries were extended by approximately 271,000 acres, which are within the maximum boundaries authorized by the act of May 30, 1934. The extension, a major part of that required to complete the park, includes some 30,000 acres with mineral rights purchased by the United States in 1951 with \$97,000 donated by the State of Florida; 60,000 acres of Florida-owned land, expected to be transferred soon to the Federal Government; 10,000 acres donated to Florida by the Collier Corp., and now in trust awaiting transfer to the United States; and 171,000 acres of privately owned land. Part of the famed Ten Thousand Islands area lies within the extension. About \$300,000 of the \$2,000,000 donated by the State of Florida for land acquisition remains for purchases in the extension. During the year, two adjoining properties of about 18 acres on Key Largo, including a residence and dock, were acquired and are being used as a ranger station for the Florida Bay district of the park. In acquiring lands as the basis for Everglades Park it has taken some years to settle complicated court cases and to wind up negotiations and settlement. This has been done within the fund donated for the purpose by Florida, and with but one single appeal beyond the original court of jurisdiction.

Important steps were taken toward the fulfillment of the Cape Hatteras National Seashore Recreational Area project. About 2,600 acres of land was purchased with \$180,000 of the \$1,236,000 donated in 1952, half by the Avalon and Old Dominion Corps., and half by the State of North Carolina, for establishment of the area. These lands are on Hatteras and Bodie Islands and include the so-called Gooseville Gun Club property, a favorite haunt of migratory waterfowl. Additional tracts on the two islands, totaling 3,000 acres, are being acquired by State condemnation. Also, the Service has options involving some 500 more acres to cost \$40,000. By the end of the fiscal year, 23,000 of the 28,500 acres scheduled for inclusion in the project had been acquired or were under option for acquisition.

The early establishment of Cumberland Gap Historical Park as a unit of the National Park System was anticipated; only the closing of certain streets in Middleboro, Ky., was holding it up. The States of Kentucky, Tennessee, and Virginia have acquired some 20,000 acres of land at a cost of about \$1,500,000 in the past 10 years, to be deeded to the Federal Government for the project.

Negotiations for the majority of tracts needed for Independence National Historical Park were well underway to settlement. Virtually all of the properties within the project are expected to be acquired by 1955, with the exception of the Irvin Building, which is not at present proposed for acquisition. Obligations to date on completed purchases, contracts to purchase, and for condemnation awards total approximately \$5,650,000 of the \$7,700,000 appropriated for acquisition of properties necessary to establish the area.

The State of Maryland was still in the process of acquiring some 800 acres, chiefly of mountainous terrain, as its portion of the Harpers Ferry National Monument project. The State had previously appropriated \$40,000 for the purpose. In 1953, the State of West Virginia transferred some 500 acres of land and scenic easements to the Federal Government, including a portion of the old historic section of the town of Harpers Ferry.

*Exchanges, donations, and purchases.*—A highlight of the year was the virtual completion of exchanges to secure Federal ownership of lands heretofore held by the State of Montana in Glacier National Park. Involved is the exchange of about 200,000 acres of public domain grazing land in eastern Montana for about 9,350 acres of timber land in the park. The value of each is approximately \$800,000. On the same equal-value exchange basis, the Service acquired a total of about 1,200 acres in Glacier, Lassen Volcanic, and Olympic National Parks, Gettysburg and Petersburg National Military Parks, Theodore Roosevelt National Memorial Park, and Joshua Tree National Monument. Pending exchanges involve several thousand acres in the Theodore Roosevelt and Joshua Tree areas, and the Service proposes to exchange some 6,700 acres of excess federally owned lands in Queets Corridor and Ocean Strip, adjacent to Olympic National Park, for privately owned lands in western national parks.

Donations included 430 acres of land for Acadia National Park by John D. Rockefeller, Jr.; 60 acres for the Home of Franklin D. Roosevelt Historic Site by the Franklin D. Roosevelt estate; 2 acres for Antietam National Battlefield Site by the Washington County, Md., Historical Society, and 2.12 acres for Hampton Historic Site, purchased with funds donated by the Avalon Foundation. Other lands acquired by donation include: 270 acres for Grand Teton National Park from the Jackson Hole Preserve, Inc.; 37 acres for Manassas National Battlefield Park from the State of New York; a half-acre parcel of land for Fredericksburg and Spotsylvania County National Military Park from the Confederate Memorial Literary Society; and 995 acres in fee and 318 acres of scenic easements for Natchez Trace Parkway from the State of Mississippi.

In addition to the above acquisitions, the Service purchased or contracted to purchase approximately 2,100 acres of important privately owned properties in Glacier, Great Smoky Mountains, Kings Canyon, Lassen Volcanic, Rocky Mountain, Yosemite, and Zion National Parks, in Gettysburg National Military Park, and in Colorado, Glacier Bay, and Sitka National Monuments. About \$300,000 is involved in these purchases.

*Special and defense uses of park lands.*—At the end of the year, approximately 1,600 special-use permits and 50 national-defense-use permits were in force in areas of the National Park System. The special-use permits covered mainly small parcels of land being farmed to maintain historical and rural scenes, or are for access facilities from private lands to park roads, and for utility lines. Of the defense-use permits, the majority were for short-term training purposes.

The Atomic Energy Commission continued its reconnaissance surveys for strategic minerals in park areas. It completed a report on Fossil Cycad National Monument disclosing possible commercial ore bodies within the monument boundaries, and recommended a more thorough investigation for a proper evaluation of potentialities in the area.

## SOLVING WATER PROBLEMS

*Water resources and rights.*—In full compliance with individual State laws, progress continued in the complicated but important acquisition of essential water rights in park areas. These are necessary for adequate servicing and protection of the areas and their millions of visitors. Since 1936, the Service has established 380 rights to the use of water in 47 national parks, monuments and recreational areas in the 13 Western States. About half are covered by decree or water laws; the remainder are in permit form. At the end of the year, there were 42 water right applications to file as a result of amended State water laws, or because of the probable construction of new water systems within the next few years.

During the year, the Service inventoried the 156 Federal and 44 private water rights in Grand Teton National Park and was progressing with the work of defining Federal and private responsibilities for maintenance and operation of the water systems. In Death Valley National Monument, Federal acquisition of three tracts of land and appurtenant water interests to eliminate conflicts with Federal water interests was nearing completion. Steps were initiated to prevent further conflicts with Federal water interests at Organ Pipe Cactus National Monument by those authorized to use the area for grazing purposes.



The Service continued cooperation with the Geological Survey, New Mexico State agencies, and the Carlsbad Irrigation District on important water resource matters. One was on measures to control the ground waters of the Black River extension of the critical Carlsbad ground water basin; another, to protect Federal rights to the use of Rattlesnake Springs water for Carlsbad Caverns National Park. Cooperation was also continuing with the town of Tropic, Utah, in an attempt to find a more adequate water supply for the town without encroachment on Bryce Canyon National Park.

## LAND AND PROPERTY DISPOSAL

*Transfers of land and property to other agencies.*—Increased emphasis was placed on the elimination of areas and area-units considered lacking in true national significance and that attract primarily local visitation or use. Some 4,660 acres were thus transferred to State and local bodies for inclusion in their park systems.

In May 1954, the President approved legislation abolishing Shoshone Caverns National Monument and authorizing transfer of the approximately 213 acres of land to the city of Cody, Wyo., for park purposes. Also, title to an 0.41-acre parcel of land in Morristown National Historical Park was conveyed to the city of Morristown for its use.

Approximately 4,447 acres of the Catoctin Recreation Demonstration Area was transferred to the State of Maryland for its park system. In formal ceremonies on June 11, the director of the National Park Service presented the title to this property to Gov. Theodore R. McKeldin. The name "Catoctin Mountain Park" has been approved for the approximately 5,747 acres remaining in Federal ownership. Camp David, the mountain retreat of the President of the United States, and the two long-term camping establishments remain in the sector of the park still being managed by the office of National Capital Parks.

Legislation authorizing the abolishment of Old Kasaan National Monument and transfer of the lands to the Forest Service was pending at the end of the year. Other proposals to abolish 6 national monuments and 1 national battlefield site and to transfer the lands to the respective States or to dispose of as surplus property were under discussion with the various congressional delegations and the States.

*Real property disposal.*—The Service continued its cooperation with the General Services Administration and other agencies in connection with the disposal of surplus Federal real-property under provisions of the Surplus Property Act of 1944, as amended. Eight applications for the acquisition of such lands by State and municipal agencies for

public park, recreation, and historic monument use were processed. These totaled approximately 325 acres and 4 buildings, and have returned about \$27,537 to the United States Treasury.

After lengthy negotiations, the 35-acre Hospital Cove area on Angel Island in San Francisco Bay, including a boat harbor and some 30 buildings, was transferred to the State for use as a historic monument. Gov. Goodwin J. Knight accepted the deed on March 11, 1954. The California State Park Commission has filed an application for an adjoining 140 acres for similar purposes upon termination of use by the Department of the Army.

As required in connection with surplus real property sales, deeds conveying title usually contain a provision that the recipient body will use the area for the purpose indicated over a certain period of years and report biennially on area management. As a result of a recommendation by the Secretary's management survey team, responsibility for enforcing such provisions was delegated to the Service by secretarial order of March 30. Previously, the Bureau of Land Management was the responsible agency.

## COOPERATIVE ACTIVITIES

The Service continued its program of river basin studies with new emphasis on basinwide surveys. An important step was the completion of the Report on the Recreation Resources of the Rogue River Basin, Oreg., requested by the Secretary of the Interior in 1950. In addition, important and satisfying progress was made on the Arkansas-White-Red River Basin, and New York-New England region projects, and the Missouri River basinwide study. In the last of these, inventories of existing and potential recreation areas were virtually completed. The pilot Research Report on Recreation Habits, Needs, and Desires of the People of the Niobrara River Basin, Nebr., was prepared by Iowa State College.

Work in the Columbia River Basin was limited to cooperation with the Bureau of Reclamation and other agencies, and the group camping survey of the project area conducted by Washington State College. The recreation survey of the Gunnison River drainage in Colorado continued with inventory work on national forests and Colorado Game and Fish Commission lands.

*Recreation planning of areas.*—Recreation planning of reservoir areas continued to be an important form of cooperation with the Bureau of Reclamation and the Corps of Engineers. In addition, three reservoir management agreements were executed; the Service played an important part in the consummation of these. Four reservoir areas in Wyoming are being administered by the State under tem-

porary licenses granted by Reclamation during the year. In addition a dozen agreements are nearing the final stages of negotiation.

Little progress was made in the reservoir development phase of the river basin studies program. Congress did not act on the bill, S. 40, to authorize recreation development at reclamation reservoirs.

*Seashore study.*—Donated funds made it possible to launch a study to identify the major remaining opportunities to conserve natural seashore or coastal areas on the Atlantic and gulf coasts. The study, conducted in close cooperation with the States, will require a year or more to complete. Full consideration is being given to areas valuable for unique or rare plant and animal communities. Donated funds are also largely supporting a comprehensive 2-year scientific study of the Cape Hatteras National Seashore, under cooperative agreement with the Office of Naval Research and the University of Louisiana Institute of Coastal Studies.

*Alaska recreation resources survey.*—This study, begun in 1950, is complete except for final preparation and publication of some of the reports. The two volumes of part I of the overall report—Economic Aspects of Recreation in Alaska, and Analysis of Alaska Travel with Special Reference to Tourists—were published during the year.

As part of the survey, the Service undertook an investigation of the Kongakut-Firth River area in northeast Alaska in cooperation with the Office of Naval Research, which sponsored the project, the Geological Survey and the University of Pennsylvania. The report recommends protection of the area for research and appropriate wilderness recreation. The Service also participated in and gave general direction to a cooperative study of the human and natural history of Katmai National Monument, which is being continued this summer.

*Cooperation with the States.*—The Service has continued to make available to the States a wide variety of advisory and consultative assistance in their park and recreation problems. In addition to many other services, such assistance was given on 193 occasions to 40 States. A Service study of the Illinois-Mississippi Canal in Illinois, undertaken for the State, recommended that the canal be transferred to the State for administration as a through recreational waterway.

Publications issued included State Park Statistics, 1953, and a leaflet, Public Recreation Areas in the Vicinity of Washington, D. C. A Digest of Laws Relating to State Parks and Recreation was prepared under contract.

## WINTER USE OF WESTERN PARKS INCREASES

An upsurge in winter use of certain western national parks and public pressure for improvement of year-round facilities in others



was an important development of the year. In Yosemite National Park, a new winter-visitation record was set in its Badger Pass ski area. From December 19, 1953, to April 18, 1954, a total of 98,662 visitors were recorded as compared with 93,186 the previous year. Enlargement of the Badger Pass Ski Lodge and some slope improvement has been proposed.

At Hidden Valley ski area in Rocky Mountain National Park, 7,790 cars carrying 31,160 visitors were counted from mid-December 1953 to April 25, 1954. Of these, 7,714 were skiers. The Service has undertaken studies preparatory to improving skiing conditions at Hidden Valley. The director, however, has informed the Hidden Valley Development Committee that a permanent chair-lift ski tow would conflict with Service policy and was not being approved.

Winter activities, primarily skiing, continued in a limited degree at Sequoia, Mount Rainier, Lassen Volcanic and Olympic National Parks and to a lesser degree at Crater Lake National Park. In Olympic, where the Hurricane Ridge Lodge has been completed, studies were expected to get under way soon for a proposed winter use area at Hurricane Ridge. It was hoped that construction there could be finished coincidentally with completion of the Heart of the Hills Highway which will lead to the area. A study for a minor winter use development in the Manzanita Lake area of Lassen Volcanic National Park was completed during the year.

## DEDICATIONS AND PAGEANTS

Perhaps the most interesting celebration to occur in a national historical area during the year was the dedication of the George Washington Carver National Monument as a memorial to the life and accomplishments of the famed Negro scientist. At the dedication ceremony in July 1953, the Secretary of the Interior and the director were speakers, joining the local community and its representatives in this important event.

Wright Brothers National Memorial was the scene of an elaborate 3-day celebration of the 50th anniversary of the first flight of a heavier-than-air machine. Almost every leader in the development of flight was present and participated in the ceremonies.

Community pageants were again presented in several of the historical areas during the summer season of 1953, including the Lost Colony at Fort Raleigh National Historic Site, Sword of Gideon, a drama of the American Revolution given at Kings Mountain National Military Park, and the Hiawatha Pageant offered at Pipestone National Monument.

## PARKS IN AND NEAR THE NATION'S CAPITAL

The National Capital Parks comprise one unit of the National Park System. It administers a system of parks, monuments, memorials, roads, and parkways in the Nation's Capital and sizable acreages outside metropolitan Washington. In these areas, the total of 6,043,386 visitors in 1953 showed an increase of 963,784 over 1952 when 5,079,602 were recorded.

Of significant importance was the progress on construction of the Baltimore-Washington Parkway and the transfer of certain lands to the State of Maryland, mentioned in more detail elsewhere; the reconstruction of Beach Drive, scheduled for completion in August 1954, and improvements to the House Where Lincoln Died and in the east wing of the White House. A contract was awarded for demolition of 42 wartime temporary buildings at Fort Washington, Md.; completion of this work will make the large riverfront portion of the 341-acre tract available for park purposes. The old fort, several historic houses, and representative examples of other seacoast defenses located in the area will be retained for exhibits.

*Washington carillon.*—The 49 permanent full-size bells of the Washington carillon, a gift of the people of the Netherlands to the people of the United States, were officially presented on May 5, 1954, in ceremonies at the temporary carillon site in West Potomac Park. Dr. L. G. Korstenhorst, chairman of the Second Chamber of the States General of the Netherlands and chairman of the Bells for America Committee, made the presentation. The Hon. Joseph W. Martin, Jr., Speaker of the House of Representatives, accepted the gift for the United States. Assistant Secretary of the Interior Orme Lewis was host and chairman for the event.

*Ford's Theater.*—The 83d Congress enacted legislation signed on May 28 directing a study and cost estimate on the restoration of the historic Ford's Theater as it was on April 14, 1865, the date President Lincoln was assassinated. The study, to be undertaken early in fiscal year 1955, will also include a cost estimate for reinstallation of the Oldroyd collection of relics.

*Dutch elm disease.*—The Dutch elm disease, which threatens the elm tree population in the Nation's Capital, continues to worsen. Of 276 cases located in the District in fiscal 1954, 50 were on National Capital Parks property where control procedures were continued. Elimination of the disease will be possible only by adequate scouting and control procedures on a citywide basis and the Service continues to urge the District government to give this matter serious attention.

## FINANCE AND ACCOUNTING

Expansion of the Service's workload incident to the tremendous increase in park use was again recognized by Congress by modest increases in fiscal year 1954 appropriations. The total of \$33,853,850 provided was divided as follows: \$8,869,550 for management and protection; \$8,300,000, maintenance and rehabilitation of physical facilities; \$13,916,300, construction of parkways, roads and trails, buildings, utilities, and similar facilities; \$1,500,000 for liquidation of a previous highway contract authorization; and \$1,268,000 for general expenses including \$83,000 in supplemental appropriations for a United States Park Police pay raise.

*Improvements in accounting.*—Two years ago, the first step was taken in decentralizing to the field authority and responsibility for many fiscal matters. Other improvements are under way as the result of a survey of accounting, fiscal, and reporting operations and procedures completed in 1953-54 in cooperation with the General Accounting Office and the Department's Budget and Finance Division.

The principal changes that have been effected or will be in the next fiscal year are: (1) Reduction and consolidation of field accounting from 48 small offices to about 28 offices servicing a larger number of areas, resulting in a substantial saving in costs and releasing needed funds for essential park operations; (2) provision for a complete accounting entity at each accounting office by decentralizing certain functions from Washington to the field; (3) reduction of the number of allotment accounts by maintaining accounts only for each primary appropriation activity with appropriate cost accounts at the subactivity level, giving superintendents a wider latitude for the most advantageous use of funds; and (4) consolidation of budget submissions and accounting reports at the regional office level with regional directors given authority to effect adjustments in funds, personnel, and equipment as needed by the various areas.

*Fees revised to produce more revenue.*—Acting upon a suggestion of the Bureau of the Budget in November 1953, a major revision in the schedule of fees collected from park visitors was accomplished and the changes were effected as of June 16. Fees in many areas were increased; in others, adjustments were made in line with increased costs of providing visitor services and facilities. Other changes were made to provide a more equitable fee structure depending on the area and the different types of services and facilities.

One of the difficulties of fee collections in the past has been the lack of sufficient personnel to staff entrance checking stations the full time it would be productive to do so. The 1955 appropriations bill provides for additional seasonal personnel for this purpose. It is anticipated, therefore, that the increased fees and the added staff to collect them



will increase Service revenues by approximately \$1,000,000 annually.

*Utility services on reimbursible basis.*—During the year, the Service formulated and established uniform criteria with respect to rate schedules concerning the sale of all types of utility services to concessioners, contractors, permittees, and other authorized users. As a result, new utility rate schedules have been established throughout the Service, and, by legislative approval, utility services will be furnished to users on a reimbursable basis. This permits financial flexibility in working out satisfactory utility arrangements in the field areas and will provide the Service with approximately \$180,000 annually in appropriation reimbursements to offset the cost of the services. Previously, collections from utility sales were credited to general fund revenues and were not available for park operations.

## PUBLIC BENEFACTIONS

Donations by public-spirited citizens and organizations of moneys, lands, historically significant properties, and other assets have greatly increased the value of the national heritage over the years. In fiscal 1954, monetary donations for general and specific purposes, several of which are mentioned elsewhere, amounted to a total of \$442,745.42, in addition to many direct gifts of lands and historical objects. Also, \$1,585 was donated to the fund for the preservation of the birthplace of Abraham Lincoln, and the National Park Trust Fund was increased by an amount indicated below.

Unfortunately, space is lacking to acknowledge individually the numerous generous contributions of lasting value to present and future generations. The National Park Service wishes, however, to express grateful thanks to all the benefactors in behalf of the American people.

*National Park Trust Fund.*—In 1935, the Congress established the National Park Trust Fund Board, with authority to accept donations of personal property “for the benefit of, or in connection with, the National Park Service, its activities, or its service.” The first concerted effort to build up the limited resources of this fund was launched during the year with issuance of *The Fifth Essence*, a handsome brochure published by the Trust Fund Board with funds donated for the purpose. This book, written by Freeman Tilden, calls attention to the possibilities the fund offers for contributions from corporations and individuals as authorized by Federal tax laws. It indicates some of the needs of the Service unlikely to be met with appropriated funds and the opportunities these present for lasting public service. As a result of initial distribution of the book and other continuing efforts, the fund was increased by donations of \$9,997.05.

With accrued interest of \$952.94, a total of \$10,949.99 was added during the year. Authorized fund expenditures totaled \$3,500, used for appraisal of certain privately owned lands within Grand Teton National Park.

*A future prospect.*—It appeared likely at the end of the year that another substantial gift would be received from John D. Rockefeller, Jr. The 1955 appropriation bill, at the White House awaiting the President's signature on June 30, contains a \$500,000 amount which will satisfy the proviso in Mr. Rockefeller's offer of \$500,000 for general land acquisitions when a like sum is received. A plan for a land acquisition program for use of the \$1,000,000 has been prepared in anticipation of this fund.

## PERSONNEL MANAGEMENT

Personnel staffs were faced with a tremendous position classification workload during the year due to reorganization of the Service and other factors. Also, emphasis was placed on developing a forward-looking personnel management program through occupational studies, training courses and new training manuals.

Inservice transfers and promotions, especially in the field of supervision, were particularly numerous. A total of 657 position-descriptions were prepared and the positions allocated by May 31. Of these, 181 were reorganization allocations. By the end of the year, position classification work and related actions on the reorganization has been substantially completed for the Washington office and the design and construction field offices. Again, as in 1953, the Whitten amendment required review of all existing positions which resulted in submission of 160 redescriptions.

Other important moves included a general study of superintendent positions, revision of park ranger class specifications, and preliminary work on two proposed new classification series of park specialist and park administration. In anticipation of legislative action whereby the Civil Service Commission would become the wage-fixing authority for Federal Government per diem employees, a file on wage rates and wage-fixing practices in the Service's field areas was being compiled for use by the Commission.

*Seasonal employee examinations.*—In keeping with the Civil Service Commission requirements, promulgated during the year, that the Service recruit seasonal uniformed personnel through competitive examination, boards of examiners were established in each of the four regional offices. These boards handled the registers for seasonal rangers, ranger naturalists, ranger historians, and ranger archeologists. At the end of the fiscal year it was still too early to evaluate the results of the new procedure.

*Employee training.*—The Service conducted its 12th general administration training course in the Region 2 office in Omaha from October 19 to October 31, 1953. The 25 employees participating were instructed in all phases of Department and National Park Service policies, management, and operation. Benefits of the course were extended by requesting park superintendents to organize field groups through which those who had completed the course could train other area employees. A total of 293 employees have completed the course since 1940.

Four outstanding field employees were selected by the Service to participate in the fifth departmental management training course in Washington, D. C., from September 1953 to the end of April 1954. After a 4-week orientation course, the trainees undertook on-the-job training assignments in the National Park Service and other offices of the Department.

Numerous other training courses, some of which are mentioned elsewhere, were held by technical units, regions, and areas to promote greater employee efficiency.

The Service's training officer was selected to attend the 53d session of the Federal Bureau of Investigation National Academy, March 22–June 11, a course which will enable him to increase the effectiveness of field-employee training in law enforcement procedures and techniques.

Noteworthy accomplishments were the preparation and issuance of a Guide to Supervisory Development, a field-level supervisory training manual, and an Information Handbook, for field personnel having public-contact duties and for training seasonal employees. Both were being put to good use in the field.

## THE ADVISORY BOARD

The Advisory Board on National Parks, Historic Sites, Buildings, and Monuments held two meetings during the year on Service matters and continued to give invaluable advice and assistance. On July 1, 1953, two new board members, Walter L. Huber of San Francisco, civil engineer and conservationist, and Harold S. Wagner, director-secretary of the Akron (Ohio) Metropolitan Park System, were appointed by the Secretary of the Interior. They replaced Dr. Ralph W. Chaney, professor of paleontology of the University of California, and Tom Wallace, editor emeritus of the Louisville (Ky.) Times, whose terms expired on June 30, 1953. Mr. Huber is an honorary vice president and former president of the Sierra Club of California. Mr. Wagner is a board member of the American Institute of Park Executives and a life board member and former president of the National Conference on State Parks.



## OUTSTANDING NATURAL PHENOMENA

*Kilauea erupts.*—The 2-year quiescence of Halemaumau, fire-pit of Kilauea Volcano, Hawaii, was broken at 4:10 a. m., May 31, by a spectacular eruption which produced a molten fountain of lava 600 feet high. Within 30 minutes, a half-mile-long fissure broke open on the floor of Kilauea Crater—the first such occurrence in the parent crater since the mid-19th century—and lava fountains gushed 100 feet high. The Halemaumau fissure extended northeast-southwest across the 100-acre floor of the pit, and the Kilauea outbreak continued along the same line. Fifteen minutes after the activity began, the entire sky was aglow with bright orange-red smoke and fume clouds rose rapidly to 30,000 feet; the fire-pit and parent crater were boiling cauldrons.

The eruption subsided as quickly as it began. Within 8 hours, the highly spectacular phenomenon had simmered to irregular extrusions of spatter. By noon of June 4 activity ceased. The new 4,500,000 cubic-yard deposit of lava in Halemaumau raised the floor of the crater 20 feet—within 450 feet of the rim; 500,000 cubic yards of lava were deposited on the Kilauea Crater floor.

In the first 24 hours after it started, some 15,000 persons witnessed the eruption. Park personnel, assisted by Hawaii County police, installed portable fences, roped off danger zones, and established a one-way traffic pattern. Many visitors watched the activity from Volcano House and Uwekahuna Overlook where views of the scene were particularly spectacular.

*Mount Trident eruption.*—Mount Trident, in Katmai National Monument, Alaska, continued through the 1953 summer season the eruption which began in February 1953. The phenomenon was under observation by the field research team studying volcanic and seismic forces, plant and animal ecology, ethnology, and archeological remains in the monument.

*Landslide creates new lake.*—A large landslide in Stony Creek Canyon, Mount McKinley National Park, Alaska, in the summer of 1953 formed a dam in the creek bed, creating a lake above the slide, which is now a half-mile long. The slide was discovered on July 18, 1953, by an airplane pilot flying over the area. The cause is unknown, though the mountain face exposed shows that the material slid from a layer of permafrost, probably thawed by heavy rains and loosened by earthquakes active at the time.

*River bank swallowed.*—At Pittsburgh Landing, Shiloh Military Park, historic scene of General Grant's successful 1862 battle leading to the siege of Vicksburg, floodwaters of the Tennessee River-Kentucky Lake section carried 20,000 cubic yards of river bank into the rushing waters in February 1954. Several large trees and 55 feet of the Pittsburgh Landing loop road went, too. Park officials have

been consulting with Army engineers and the Tennessee Valley Authority in an effort to remedy the damage.

*Blizzard traps motorists.*—A severe blizzard on Trail Ridge Road in Rocky Mountain National Park, Colo., trapped 36 motorists for 12 hours on June 6. Park rangers and snow plows assisted the motorists in reaching safety.

*Spectacular rookery displays.*—A notable revival of several recently inactive rookeries in Everglades National Park produced spectacular displays of wood ibis, white ibis, and egrets.

## OF SIGNIFICANT INTEREST

*Challenge of the Mountains.*—The high mountains in the national parks continue to provide a strong lure to the rugged and fearless. In Rocky Mountain National Park, 1,856 ascents of Longs Peak were recorded; of this number 111 climbed the peak's difficult east face. On June 5, Earl Harvey, 20, of Gretna, Va., fell to his death while climbing the peak. New records in climbs and numbers of climbers were set in Grand Teton National Park. In Mount McKinley National Park, in the central Alaska wilderness, of the 11 persons in 3 parties attempting the difficult climb to the 20,300-foot summit of Mount McKinley—highest peak in continental North America, 6 were successful. One four-party group, led by Elton Thayer, reached the summit May 15 thereby establishing a new record of a first-time successful climb via the South Buttress route.

The success of the Thayer party ascent was dimmed by a fatal accident in descending when the four fell, slid, and tumbled more than 1,000 feet from the 13,800-foot Karstens Ridge. Thayer was killed instantly, and George Argus seriously injured. The other two, Leslie Berieck and Morton Wood, brought Argus to a safe place on Muldrow Glacier at 11,000 feet and walked out for help. Rescue was effected with the help of a civilian climbing group, members of the Arctic Indoctrination Center at Big Delta, and the 74th Air Rescue Squadron from Ladd Air Force Base.

The Service continues its policy of requiring climbers to obtain permission from the superintendent before attempting the more hazardous ascents and to report upon return. It assumes no responsibility or liability for mountain-climbing accidents, though its employees are frequently subjected to serious hazards, and the Service to heavy expense, in rescue operations.

*Park ranger killed by rocks.*—Charles R. Scarborough, assistant chief ranger of Yosemite National Park, was struck by rocks falling from Clark's Point Cliff while on a pack trip to Merced Lake. He and his horse were killed instantly, marking the first death of a permanent ranger while on duty in Yosemite.

*Visitor accident.*—A serious accident occurred in Mount Rainier National Park March 17 when Miss Delores VanParys, 17, of Seattle, fell from the parapet above Narada Falls to which she had climbed. Slipping and falling 179 feet to the bottom of, and beyond, the falls, she was critically injured but it was reported later she would recover. Rescue was effected by rangers and Air Force personnel who happened to be at the scene.

*Horse Roundup.*—A unique method of enforcing grazing trespass regulations in Theodore Roosevelt National Memorial Park brought good results but some temporary confusion in the minds of park friends. Because certain stockmen ignored notices to remove their stock from the park, a horse roundup was conducted April 30–May 2. Widely publicized through efforts of the Greater North Dakota Association, the event was misinterpreted by some as a “wild horse” roundup and the Service was criticized for “removing wild horses from the park.” Large crowds gathered and the event attracted nationwide newspaper and photographic coverage. No wild horses were found.

*Official honored.*—Assistant Chief Naturalist H. Raymond Gregg of the Washington office was elected Fellow of the American Association for the Advancement of Science on June 2, 1954.



## Office of Territories

William C. Strand, *Director*



**T**HE second year of a new administration of the territorial responsibilities of the United States has been a year of accomplishment and progress.

The Alaska Railroad moved from a \$42,000 loss in fiscal year 1953 to a \$766,000 profit in fiscal year 1954.

Through the sale of hundreds of houses and other property items the affairs of the Puerto Rico Reconstruction Administration were brought to a final stage of liquidation.

With the support of the Department a revised organic act was passed for the Virgin Islands which will place the administration of that island on a sound and forward-looking basis.

Also, in the Virgin Islands Bluebeard's Castle Hotel was sold and the Virgin Islands Corporation began the disposition of 800 acres of land to small farmers.

Active support was given to bills passed by Congress effecting the transfer of certain military lands to the Territory of Hawaii and authorizing the issuance of public improvement bonds to finance the extension of electrical service in the island of Kauai.

The trust territory government was greatly strengthened by moving several of its departments to locations in the islands and by a decision to move Honolulu headquarters to Guam pending the establishment of headquarters in the trust territory itself.

Substantial progress was made in securing Federal mortgage money for Guam housing developments. Cordial relations with the military on the island were greatly strengthened.

The last fiscal year saw the transfer back to the Department of the Navy of all the islands of the northern Marianas except Rota.

The governors of our Territories have given wise and aggressive leadership to the task of finding orderly solutions to territorial problems. They have been strongly supported in their work by field officers of the office of the Territories, and by island territorial officials, with a minimum of reliance upon Washington.

During the year the office of Territories has been diligent in cooperating with the Department's policy of eliminating nonessential and extravagant Federal functions.

In Alaska commissary operations of the Alaska Railroad, born of a pioneer period when retail facilities had not been established, have been eliminated because their reason for existence has long since disappeared. The railroad has leased its proprietary interest in a large power plant to an electrical cooperative in the Anchorage area and is planning to dispose of this interest to the same cooperative at an early date.

In the trust territory the office is carrying out a congressional directive to discontinue its trading operations in copra, and in Samoa a government-owned fish cannery has been leased for private operation.

The battle for statehood for Hawaii to which the office of the Department gave wholehearted support was unfortunately unsuccessful. That battle will be continued with vigor, however, until self-government on a statehood basis has been achieved.

Governmental problems in Alaska are more complex because of military necessities, the dominance of the Federal Government as a landowner, and the small size of the population. During the year Governor Heintzleman has taken the lead in pointing out positive solutions to the problems which these conditions have produced.

The year saw the completion of a \$50,000,000 pulp plant near Ketchikan which is giving new life to business in southeastern Alaska, an accomplishment which owes a great deal to the vision and initiative of Alaska's Governor.

As a part of an overall program for increasing the effectiveness of the work of the Department, a special survey team made a careful review of the work of the office of Territories and recommended changes in its administrative organization. Under the revised administrative setup the work of the Caribbean and Pacific Divisions was consolidated in a new Insular Division. The Alaska Division was reorganized to include all operating functions in Alaska except public works. The Alaska and Virgin Islands public works programs are now being directed by the office under a public works adviser.

There follows a more detailed review of territorial highlights for the past fiscal year.

## ALASKA

### *Statehood*

Legislation to provide for the admission of Alaska to the Union was introduced in both Houses of the 83d Congress. The Alaska legislation was approved by the Senate as an amendment to the Hawaii state-

hood bill. The combined bill was returned to the House for consideration of the Senate amendments, but by the close of the fiscal year no action had been taken.

### *Industrial Development*

The opening in 1954 of the Ketchikan Pulp Co.'s high alpha dissolving pulp plant at Ward Cove, Alaska, marked an historic turning point in the economic and industrial life of the southeastern area. This pioneering venture was undertaken by the Puget Sound Pulp & Timber Co. of Bellingham, Wash., and the American Viscose Corp. of Philadelphia and New York at a cost of about \$50,000,000. Alaska has been dependent to a large extent upon seasonal industries with no major manufacturing or processing enterprises to provide steady year-round employment and activity. This new plant will play a major role in the growth and stability of the Territory.

### *The Alaska Railroad*

The Alaska Railroad continued to improve its facilities in fiscal 1954 to the extent that funds were available. Many changes were made in tightening up the railroad's operations during the year and every effort was made to curtail expenses. A greater volume of freight was moved than ever before but freight revenues were under 1953 because of the lower rated tonnage carried and a decrease in ton-miles. As of June 30, 1954, there were 1,896 employees on the payroll which is a decrease of 460 compared with the 2,356 on June 30, 1953. A highlight of the year was the appropriation by Congress of funds for the rehabilitation of the line from Seward to Portage and for the completion of a new dock at Seward. Plans for both projects were well advanced at the close of the fiscal year.

Effective June 1, 1954, the railroad commenced free delivery of all less-than-carload freight within the city limits of Anchorage and Fairbanks and to developed areas outside of the city limits. This change has provided an important new service, which has been well received by Alaskan consignees and shippers.

In November 1953 the Secretary of the Interior appointed a survey team to review the management and operations of the railroad. The recommendations of the survey team were approved by the Secretary and are being put into effect by the general manager in order to establish a more efficient organization. A major recommendation now being carried out by the railroad involves the disposal of surplus property acquired after the war without exchange of funds and which was accumulated far beyond current and anticipated needs.



A program for the retirement of outmoded equipment included the disposition of practically all old off-track equipment and ancient and unusable freight cars. In an effort to provide better equipment for wrecking crews, two surplus outfit cars were outfitted to replace the old wooden coaches previously used. Six additional 1500 Class diesel locomotives were received in January 1954 and 280 hopper cars were placed in service during the year. The new Anchorage yard office was completed, as well as an addition to the Anchorage fire hall. Installation of new track scales, commenced in 1953, was completed. On October 15, 1953, a new main track, running north from the passenger depot past the freight house and bypassing the yards, was placed in service. This permits yard crews to work without interference since the main line formerly extended through the yards.

### *The Alaska Road Commission*

The Alaska Road Commission's extensive program of highway improvement, construction of new roads, and maintenance of the existing system, was vigorously prosecuted during the 1954 fiscal year. At the end of the year, the road commission network totaled 3,482.4 miles of highway. During the past fiscal year, 60.5 miles of new roads were constructed, 162.5 miles of main highway were improved to a 50-mile per hour standard, and 50 miles were surfaced with a flexible asphaltic mat, increasing the total paved system to 715 miles. Of the commission's total road mileage, 1,868.2 miles were kept open to traffic throughout the year. For the first time in the history of Alaska's highways Isabel Pass on the Richardson Highway was kept clear of snow during the winter months. This reduced the wintertime truck haul from Valdez to Fairbanks by 100 miles.

The Glenn Highway between Anchorage and Glen Allen Junction is now paved, and the entire length of the Tok Cutoff portion of the Glenn Highway is under contract for paving. During the fiscal year the last 42 miles of the Richardson Highway was placed under contract for reconstruction prior to paving. Only one 44-mile section of the Alaska Highway remains to be reconstructed, and this section is scheduled for early contract award. Paving of the Seward-Anchorage Highway was completed. The initial contract for construction of 15.88 miles of the new Copper River Highway was completed, and a contract for construction of the second section crossing the Copper River Delta has been awarded.

Construction by force account of the 160-mile Taylor Highway continued. Although not yet developed to final standard, this route is passable for its entire length from its junction with the Alaska Highway to Eagle, Alaska, and Dawson, Yukon Territory. The new Denali Highway to connect Mount McKinley National Park with the

highway network is also being constructed by force account and 33.5 miles were built during the year. Petitions for the construction of access roads to homesite, farm, mining and industrial areas exceeded available funds by approximately 500 percent. Approximately 40 miles of such roads were built during the year.

### *Progress in Public Works Construction*

In 1949, by Public Law 264, Congress authorized a \$70 million program of public works in Alaska for rapidly growing Alaskan communities and in 1954 extended the expiration date of the program to June 30, 1959. By the end of the fiscal year \$41,208,200 had been appropriated to permit the construction of 80 projects.

All but two of the 50 projects estimated to cost \$15,885,330, for which funds were made available from appropriations in the fiscal years 1950, 1951, and 1952 (with the exception of minor finishing touches on one project) have been completed. Of the other two, one is three-fourths complete and the other is underway.

Completed projects include 16 schools, \$5,875,000; 3 health centers, \$112,000; 5 other public buildings, \$2,280,000; 11 water system projects, \$3,750,000; 5 sewer system projects, \$704,000; 4 combined water and sewer projects, \$940,000; 2 streets and sewer projects, \$1,170,000; 3 street projects, \$825,000; and, at the University of Alaska, a classroom and office building, a dormitory, and utilities costing \$1,040,000.

In the 1953 program \$12,242,900 was allocated for 12 projects. Of these, 4 estimated to cost \$1,789,300, have been substantially completed and 4 others, estimated to cost \$5,875,000, are more than half completed. Three of the remaining four projects are well underway and the fourth is to be started at once.

A total of \$11,788,000 was allotted for 17 projects for the 1954 program. It is expected that by the end of the 1954 season, 11 of these, estimated to cost \$8,346,000, will be under construction. Four of the other 6 projects will be started before the end of the calendar year 1954 and the other 2 with the opening of the 1955 construction season.

There has been appropriated \$9,500,000 for the Alaska public works program for the year beginning July 1, 1954. This amount brings the total appropriations to date to \$50,708,200, and provides funds for 18 additional projects.

### *Expansion in Coal Production*

The growth of the military establishment in Alaska following the Korean outbreak greatly increased the demand for coal mined in the area served by the Alaska Railroad. There are two major coal fields in this area, the Healy River field about 75 miles southwest of

Fairbanks, and the Matanuska field about 60 miles northeast of Anchorage. In response to rapidly mounting demand, coal companies in these fields nearly doubled their production in the 3 years following 1950 and produced an estimated 900,000 tons in the calendar year 1953.

In order to construct realistic production goals, in view of the wide range of military estimates as to consumption requirements, the Secretary of the Interior appointed a survey team to undertake an investigation. This study covered military and civilian requirements, existing mine capacity, need for new mines, problems of transportation, manpower and financing, as well as a review of Government leasing regulations and conservation practices. The survey will provide guidance in the development of programs by the Department of the Interior to increase coal output in the Territory in response to essential needs.

### *Territorial Health Survey*

The special field survey of Alaska health problems, under the direction of Dr. Thomas Parran, former Surgeon General of the United States, was continued in this fiscal year. This survey was initiated in the summer of 1953 to aid the Department of the Interior in planning a sound program to meet the general health and hospital problems in Alaska, with particular emphasis on combating the spread of tuberculosis. It is being made with the assistance of territorial and Federal agencies.

In a preliminary report, based on last year's survey, Dr. Parran and his associates recommended that an emergency program be launched to meet the tuberculosis problem with primary attention given to natives in outlying areas who are unable to receive hospital care. The use of isoniazid (IHN), a drug which has proven a definite value in a substantial number of active tuberculosis cases when administered orally, was recommended. The purpose of this program is to determine whether the use of IHN will result in a significant reduction of active cases.

A final report to the Secretary of the Interior will be submitted in December 1954 and will cover control of tuberculosis and infectious diseases, sanitation, mental health, nursing, maternal and child health, and programs for crippled children as well as hospital and medical care.

### *Care of the Mentally Ill*

Persons legally adjudged insane from the Territory of Alaska have been cared for at Morningside Hospital in Portland, Oreg., under contract with the Department of the Interior for approximately 50 years. At the beginning of the fiscal year 345 patients were under such



care. The Department has recommended legislation which would modernize antiquated commitment procedures and establish improved administration of the mental health program. The recommended legislation was passed by the House but had not been acted upon by the Senate at the close of the fiscal year.

## HAWAII

The Department's efforts for Hawaii throughout the period of this report were concentrated on securing passage of statehood legislation. H. R. 3575, passed by the House of Representatives last year, was approved by the Senate on April 1, 1954. The Senate version, however, contained an amendment extending statehood also to Alaska. The Senate called for a conference at which the differences might be resolved, but the bill was tabled by the House Rules Committee and consequently failed of enactment.

The Department was successful, after a serious drought emergency developed, in having Hawaii declared a civil disaster area eligible to receive Federal aid. Toward the end of the year, the Department also took steps to obtain Federal aid to ease the rising unemployment problem.

A number of bills having the active support of this Department were passed by the Congress. They included an authorization for the exchange of certain public lands for privately owned lands of equal value, the transfer to the Territory of certain Federal lands held by the military, and laws authorizing the issuance of public improvement bonds and permitting the extension of electric service to parts of the island of Kauai.

## GUAM

In the 4 years that Guam has been under the administrative jurisdiction of the Department of the Interior the territorial government has grown increasingly capable of meeting local needs. Activities of the office of Territories during the fiscal year consequently have been generally limited to situations requiring intercession with other executive agencies having responsibilities in Guam and to the field of legislation.

Although the Federal housing laws had been amended in the previous fiscal year to permit residents of Guam to obtain loans insured by the Federal Housing Administration, the construction of large-scale housing developments continued retarded for lack of private sources of long-term financing. Early in the fiscal year the Department therefore appealed to the Federal National Mortgage Association to make commitments to purchase mortgages on Guam projects. One such project consisted of about 600 dwelling units to be built at a total cost of about \$6,500,000. Since it appeared toward the end of

the fiscal year that all FNMA funds would be committed to other projects, steps were taken to include in the Senate version of the housing bill a provision earmarking \$15,000,000 for use on Guam. While this provision was deleted by the conference committee, it was understood that Guam housing needs would be met under the special assistance clause of the Housing Act of 1954. This empowers the President to instruct the FNMA to allocate parts of a \$200,000,000 fund for use in areas of extreme housing shortage.

The Guam omnibus bill embodying amendments to Federal laws recommended in 1951 by the President's Commission on the application of Federal laws was again introduced at the request of this Department as H. R. 10131. Its introduction, however, came too late for affirmative action by the 83d Congress. The Congress did enact H. R. 8634, to amend section 22 of the Organic Act of Guam so as to make unnecessary trial by jury or the prosecution of offenses through indictment by a grand jury in the District Court of Guam. Since the legal traditions of Guam stem from Spain, where the jury system is not used, this bill merely perpetuated the existing situation and clarified the intent of Congress with respect to this section of the organic act.

For the first time since the enactment of the Organic Act of Guam in 1950, the President was called upon to act on a bill twice vetoed by the Governor. The bill involved was entitled "An Act to provide for the censorship of motion pictures." On the ground that approval would constitute an encroachment on the basic freedoms guaranteed by the 1st and 14th amendments of the Constitution, the President upheld the Governor's veto.

During the year court action was taken upholding the validity of the Federal income tax imposed in Guam. The Ninth U. S. Circuit Court of Appeals in San Francisco upheld the 1951 decision of the U. S. District Court for Guam, and a petition for certiorari was filed in the Supreme Court. At the end of the fiscal year the Supreme Court had not decided whether it would hear the appeal.

## AMERICAN SAMOA

As an unincorporated unorganized territory, American Samoa and its government have continued to require close supervision by this Department. Lawrence M. Judd, the fourth Governor since the transfer to civilian administration in 1951, was forced by illness to retire on July 31, 1953, and Richard Barrett Lowe was named by the Secretary to succeed him.

Perhaps the most significant political development of the year was the passage of a resolution by the Fono petitioning the Governor and, through him, the Secretary to establish a constitutional committee to

study, draft, and recommend proposals for a territorial constitution. Such a committee was established and at least one meeting was held before the close of the fiscal year. It is expected that the Samoans will, through this committee, work out for themselves many of the questions that have in the past caused them to oppose organic legislation. The Fono repeatedly had gone on record as needing time to inform itself of the implications of government under terms of any organic act that might be passed by the United States Congress.

The economy of American Samoa is primarily agricultural with two main sources of income copra and handicrafts. During the year concerted effort was made to broaden the territory's economic base through the introduction of industries. In December the Government leased to the Van Camp Sea Food Co., Inc., of California, the fish cannery that had been standing idle since 1950. A firm manufacturing women's apparel has expressed serious interest in establishing a branch factory in American Samoa and sent a representative to the islands to review tax and other arrangements with the Governor.

One of the major deterrents to American Samoa's development is the lack of regular surface and air transportation. In April 1954 the President signed an order authorizing Samoan Airlines, a private concern headed by a Samoan, to operate on a weekly scheduled basis between Pago Pago and Apia and to provide charter service between Pago Pago, and Canton Island and Tahiti, respectively.

Topographic mapping has long been viewed as fundamental to long-range economic planning for the territory. At the end of the fiscal year arrangements were made with a New Zealand firm by the United States Geological Survey to take the necessary serial photographs for use in drawing up such a map.

## TRUST TERRITORY OF THE PACIFIC ISLANDS

During the year considerable study was given to a number of basic organizational and administrative problems in the Trust Territory of the Pacific Islands. The purpose of these studies was to bring about maximum efficiency and economy in trust territory administration and, at the same time, to permit the establishment of governmental services at a level within the future capabilities of the islands to support.

As a result of organizational readjustments the number of established stateside positions was reduced during the year from 290 to 252. In a transfer of Government departments from Honolulu to the field, the department of public health was moved to Ponape, the department of education to Truk, and the fiscal and supply office to Guam. Careful consideration was also given to the question as to whether greater efficiency and economy could not be obtained by moving the high com-



missioner's office and the remaining small staff in Honolulu to Guam. A decision to do so on an interim basis was made late in the fiscal year, pending the time when a headquarters could be established in the trust territory itself, and steps were immediately taken to arrange for the move.

Effective arrangements for the continued collection and sale of copra and the distribution of trade goods to merchandising firms in the area, received much attention during the year. The Island Trading Co., which, as an instrumentality of the trust territory government has conducted these activities for the past 6 years, will terminate its activities in December 1954. During the year the Island Trading Co. and the high commissioner and his staff encouraged the strengthening of a locally owned company in each of the districts in order that these companies might successfully take over the trading company's functions. It is believed that these efforts have been successful and the only major problem remaining to be settled is that of the sale of copra on the world markets. Micronesian companies are not as yet sufficiently experienced to undertake this complex operation and, at the close of the year, procedures were under consideration to obtain the assistance of other private firms.

In an area as vast as the trust territory, satisfactory provision for transportation service represents a difficult problem. Prior to the beginning of the year the Department had arranged with the Air Force for the loan of three SA-16 Albatross aircraft to replace four PB5A aircraft which could not be continued in use without major and expensive repairs. Since the SA-16 had never been used in a civilian operation, the Department requested the Civilian Aeronautics Administration to conduct certification tests on the aircraft. These tests revealed a number of modifications that would be required to meet certification standards. The Department then met with Civil Aeronautics Board officials to obtain waivers on certain of these modifications which it was felt would not affect the airworthiness of the aircraft in view of the special conditions under which they were to be operated. As a result the CAB issued a certification of the planes for use in the trust territory and at the close of the year the necessary modification of the aircraft was underway.

At the end of the year a very encouraging development in vitally needed surface transportation was an agreement with a transpacific shipping company to route a vessel by way of Majuro in the Marshall Islands. This will permit direct haul of copra and certain other goods from and to the trust territory without transshipment at Guam and should be of considerable benefit to the copra producers and to the trust territory administration.

Continued progress was made in discussions with other departments of the Government on certain long-standing issues. An agreement

was made in October covering detailed arrangements for the transfer to the Secretary of the Navy of jurisdiction over the northern Marianas with the exception of the island of Rota. This transfer was made pursuant to Executive Order 10470 of July 17, 1953. There were also working level discussions as to an agreement with the military agencies regarding the terms under which land in the trust territory would be retained for military purposes. Steps were taken through the Department of State to bring about negotiations with the Japanese Government for the settlement of certain contractual type claims of trust territory inhabitants against Japan as a result of World War II.

Continued authority for civilian government in the trust territory was provided with the enactment of Public Law 451. This law extends governmental authorization until 1960 by which time it is anticipated that suitable organic legislation for the territory will have been adopted.

## OTHER PACIFIC ISLANDS

Canton was visited by perhaps the highest United States Government official in its history on October 10, 1953, when Vice President Richard M. Nixon and a party of eight stopped en route from Honolulu to New Zealand on their trip around the world.

The United States Resident Commissioner on Canton signed a fishing permit which, upon cosigning by the British Resident Administrator, permitted a third company to establish fishing operations at Canton.

Preliminary discussions were held with the State Department and the Civil Aeronautics Administration regarding the supply of water, electrical power and medical services to the British and Gilbertese on Canton. This problem arose because of the anticipated termination of an airline lease for operation of the hotel on Canton.

## THE VIRGIN ISLANDS

On April 9, 1954, the Honorable Archie A. Alexander was inaugurated as Governor of the Virgin Islands.

During the year the Department's activities on behalf of the islands were concentrated on bringing up to date the Organic Act passed in 1936. On July 22, 1954, the Congress enacted Public Law 517, known as the Revised Organic Act of the Virgin Islands. This act provides for the following major changes: the establishment of a unicameral legislature composed of 11 senators, 6 elected at large; the appointment of a commission to study the applicability of Federal statute to the islands; the preparation of a code of laws; and the appointment by the Secretary of the Interior of a comptroller.

The new act provides for the transfer to the Government of the Virgin Islands during each fiscal year of a sum equal to the total amount of the revenue collected by the island government from Federal internal revenue taxes on articles produced in the islands and transported to the United States. There will also be transferred to the islands' treasury during each of the fiscal years ending June 30, 1956, the sum of \$1,000,000 or the balance of the internal revenue collections available after payments are made as provided above. The latter fund is to be used for emergency purposes and essential public projects only.

The Department was instrumental in having the Fulbright State scholarships program extended to the Virgin Islands this year. Under this program one Virgin Islander may be selected annually to receive graduate education abroad.

*The Virgin Islands Corporation.*—On December 29, 1953, Dr. Kenneth A. Bartlett succeeded Mr. Gordon Skeoch as president of the Virgin Islands Corporation which is wholly owned by the Federal Government. It has now reached the half-way mark under its 10-year charter with financial losses for the first 5 years amounting to \$2,283,069, or an average of \$456,612 per year. However, it has served as the backbone of the economy of the island of St. Croix, and without it, the Government in all likelihood, would have had to maintain a substantial relief program.

The growing of sugar cane and the production of sugar continued to be the most important operation of the Corporation. There was considerable improvement in sugar cane production during the year and field operations did not contribute substantially to the overall losses sustained. The production of sugar from cane presents a less favorable picture. The Corporation acquired a run-down and dilapidated sugar mill, which had not been adequately maintained. While substantial investments were made the mill has never been completely rehabilitated and continues to represent an inefficient factory operation. Every effort is being made to correct this situation as rapidly as possible. The board of directors has requested the Sugar Branch of the Department of Agriculture to prepare an analysis of its sugar operations and has under consideration a proposal to contract the management of the mill to a private firm.

The Corporation also owns a distillery, which is operated by the A. H. Riise Distillers Co. under lease. During the year the board voted to grant this company an option to purchase at fair value as determined by a board of arbitration. An arbitrated price of \$60,000 was set and at the end of the year, negotiations were under way for sale of the plant.

Bluebeard's Castle Hotel has at last been sold and on July 1, 1954, was transferred to Antilles Enterprises, Inc. The hotel was con-



structed in 1934 as a public works project and was leased to private concerns until 1953 when the board decided to dispose of it. Antilles Enterprises, Inc., a Virgin Islands corporation, was the highest bidder, with a bid of \$410,000 accompanied by an agreement to spend \$150,000 in major capital improvements during the first 18 months of operation.

The corporation is responsible for a highly successful power operation on St. Croix and St. Thomas, which has shown a substantial profit since it was taken over in 1952. Generating capacity has been steadily increased, additional distribution lines have been installed, and rates have been reduced.

In accordance with its decision to dispose of 810 acres of corporation-owned land the board arranged with the Farmers Home Administration of the Department of Agriculture to distribute this land among 10 farmers selected from an eligible list of 15 contestants. As a guide to future action, the Corporation arranged for an annual comparison of the productivity of the land sold with that retained by the corporation.

A livestock program to improve and develop the cattle industry was continued on a small scale. An abattoir, owned by the corporation, was on lease to private industry for the slaughter of cattle for sale in Puerto Rico.

A land and water conservation program has been carried out in cooperation with the United States Department of Agriculture's Soil Conservation Service with outstanding results. Thirty earthen dams have been constructed in St. Croix, with a capacity for impounding over 200 million gallons of water. During the past year the dam construction program was extended to the islands of St. Thomas and St. John where 9 dams with an impounding capacity of more than 39 million gallons of water were built. The impounding of this water has provided water for cattle, which is sorely needed at times, and for some irrigation. Even more important, it has resulted in the general raising of the water table throughout the islands with indirect benefits which cannot be evaluated in dollars. Wells that have been dry for years are now usable while others are supplying more water at a much less depth than heretofore. This program also includes the clearing of land which has been allowed to go to brush over the years. More than 21,000 acres have been cleared for restoration as productive agricultural land.

A small fund was appropriated for tourist development and, through the Virgin Islands Tourist Development Board, was used for the printing of the Virgin Islands Magazine for free distribution to thousands of travel agents, airlines, etc., throughout the United States.

At the June meeting of the Board of Directors, the Virgin Islands Corporation received authority to manage, if necessary, the submarine base and airport at St. Thomas presently held by the Department under

revocable permit from the Navy. The facilities consist of three types of operations: management of the airport, operation of the water department, and the rental of buildings to private individuals.

*Construction of Public Works.*—Beginning in 1944 Congress authorized a public works program in the Virgin Islands for which a total of \$11,303,592 has since been appropriated. No additional appropriations will be made since, under the Revised Organic Act, the Virgin Islands Government will construct its own public works.

The fiscal year 1954 witnessed the completion of a mile-long seawall along the shore of Charlotte Amalie Harbor and of a sewage lift station in the Long Bay housing area of St. Thomas. The formal transfer to the Virgin Islands Government of facilities completed earlier included a potable water system, sanitation and fire protection projects, and road and telephone communications systems on St. Thomas and on St. Croix.

Construction of two high schools, one in Charlotte Amalie, St. Thomas, and the other in Christiansted, St. Croix, has progressed so well that they will be completed early in 1955. During fiscal 1954, contracts were awarded and construction was well under way on several additional schools. A secondary road on St. John connecting Cruz Bay on the east coast with Coral Harbor, on the west coast, approximately 9 miles in length, is nearing completion and will be opened to traffic early in 1955. Final projects in the program, for which plans and specifications have been completed, include five additional schools and a highway back of the seawall in Charlotte Amalie.

## PUERTO RICO

*Puerto Rico Reconstruction Administration.*—With the establishment of the Commonwealth Government, the Department's activities in Puerto Rico have been largely confined to the liquidation of the affairs of Puerto Rico Reconstruction Administration.

Joint resolution (Public law 276), authorizing and directing the Secretary of the Interior to liquidate the Puerto Rico Reconstruction Administration within 18 months from the date of enactment, was approved by the President on August 15, 1953. In compliance therewith the Secretary of the Interior authorized the granting of discounts on the balance due on the purchase of certain lands and urban and rural houses, as an inducement to complete all purchases by June 30, 1954. As a result sales of housing units during the authorized discount period amounted to 527 urban and 7,520 rural units with total receipts of \$1,422,384. Expenses amounted to \$183,193. There remains 222 urban and 874 rural houses still to be disposed of during the next fiscal year.

The proceeds from the sale of coffee and other crops produced on the Castaner farm amounted to \$72,860.94, while the operating expenses amounted to \$38,825.39, leaving a net profit of \$34,035.55. The farm continued to furnish seasonal employment to more than 200 families.

No loans were made to cooperatives during the past year. Cooperative Central de P. R., Inc., was fully liquidated. At the present time only four cooperatives, originally financed by this Administration, remain to be disposed of during the 1955 fiscal year.

Operations that vary little in kind from those of previous years were financed with allotments out of the Puerto Rico Revolving Fund for projects approved by the President, as follows:

Operation and maintenance of housing projects.....	\$183, 500
Operation of Castaner farm project.....	39, 300
Servicing of loans to cooperatives.....	3, 700
General administration.....	164, 000
Repairs to buildings, etc.....	31, 400
Construction of 200 latrines.....	3, 000
Surveying and other services.....	18, 100
Reserve.....	20, 000
<b>Total.....</b>	<b>463, 000</b>

*Training Program for Technical Assistance.*—The Department of the Interior continues to serve as the Washington office of the technical assistance program for the Government of the Commonwealth of Puerto Rico, under a special agreement between the Secretary of the Interior and the Director of the Foreign Operations Administration.

The training program in Puerto Rico continued to expand during the fiscal year 1954. A total of 637 foreign nationals (including trainees, visitors and observers) visited the island between July 1, 1953, and June 30, 1954, an increase of 70 percent over the previous year. The area from which these foreign nationals came and their sponsorship is shown below:

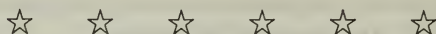
Sponsor	Latin America	Near East, Africa, and South Asia	Far East	China and Indo-china	Europe	Total
Foreign Operations Administration.....	<sup>1</sup> 274	29	37	10	3	353
United Nations and specialized agencies.....	66	12	4		5	87
Organizations of American States.....	63					63
Other trainees.....	55					55
Foreign visitors.....	74	3			2	79
<b>Total trainees and observers.....</b>	<b>532</b>	<b>44</b>	<b>41</b>	<b>10</b>	<b>10</b>	<b>637</b>

<sup>1</sup> Includes Caribbean dependent overseas territories.



# Office of the Administrative Assistant Secretary

D. Otis Beasley, *Administrative Assistant Secretary*



THE Administrative Assistant Secretary is the chief administrative officer of the Department, responsible to the Secretary for the direction of the administrative management functions. These include broadly those activities necessary to accomplish the authorization, financing, staffing and management of all departmental programs and the integrated direction of these functions for the Department. He also serves as advisor to the Secretary and other departmental officials on program and policy matters particularly with respect to the interrelations of administrative management considerations and program and policy questions. The Administrative Assistant Secretary is responsible for developing policies and standards, planning and evaluating programs, and reviewing performance in all matters concerning administrative management. The Administrative Assistant Secretary is the principal representative of the Department in transactions with the Bureau of the Budget, the General Services Administration, the Civil Service Commission and the General Accounting Office. He also acts as the Department's representative before Congressional, interdepartmental, and public groups on administrative management matters. The Administrative Assistant Secretary directs and supervises the work of the following staff divisions comprising the Office of the Administrative Assistant Secretary:

## Division of Administrative Services

Floyd E. Dotson, *Director*



The Division of Administrative Services develops and directs the application of policies and procedures with respect to administrative services throughout the Department and supplies the internal operat-

ing and housekeeping services required by the Office of the Secretary. The Division also provides other Departmental units with centralized library, museum, employee health, space, telephone, photographic, warehousing and shipping, duplicating, and printing and binding services.

*Branch of Library Services.*—The use of Central Library facilities continues to grow with significant increases in circulation of books and periodicals, and in use of the reading room. Statistics for the previous year are: patrons of reading room, 35,051; incoming telephone calls, 17,435; circulation of books and periodicals, 62,301; inter-library loans, 7,236; research and historical queries, 17,013; acquisitions, 18,409 books and 56,696 periodicals. Total of shelved holdings rose to 422,000.

*Branch of Personnel Operations.*—The Branch continued to perform normal personnel functions for the Office of the Secretary. During the year the workload of the Branch was increased with the assumption of responsibility for personnel services in connection with the defense activities attached to the Department and with the transfer of all legal and supporting personnel from the bureaus to the Office of the Secretary.

*Fiscal Section.*—This Section provided the regular budgeting and accounting services for the Office of the Secretary and also for the Defense Minerals Exploration Administration, Defense Solid Fuels Administration, Board on Geographic Names, and for the working capital fund. The section also handled the control, budgeting, and reporting work on the approximately \$4,000,000 in funds transferred from other agencies for use by the various bureaus of this Department. Expenditures by the Office of the Secretary during the year were about \$4,000,000, and operations under the working capital fund were approximately \$1,155,000.

*Records Management and Space.*—A new standard filing system was developed and installed in the Central Files Section. As part of the records disposal operations 500 cubic feet of obsolete records were destroyed, and 300 cubic feet of inactive records were transferred to Federal records centers for storage. This represents a savings of 135 file cases, with an approximate replacement cost of \$6,000. The mail and files operations in the Office of Territories were surveyed in cooperation with the Division of Management Research, and improved techniques and operating patterns were recommended. All employee personnel folders were rearranged to agree with revised standards of the Civil Service Commission.

The Department gained 1,100 square feet of floor space in the Interior Building and released 6,600 square feet of rented space in the metropolitan Washington area. The net reduction of 5,500 square feet resulted from the cutback of defense agencies affiliated with the

Department. Space gained within the Interior Building was utilized to realign offices and personnel for greater efficiency and economy.

*Museum.*—The Interior Department Museum maintains extensive collections of educational and scientific models, specimens, artifacts, and special exhibits which illustrate the Department's history, aims and activities. During the year 31 exhibits were brought up to date, and 12 special exhibits were prepared and shown. Some 43,000 persons signed the visitors' register, an additional 23,000 viewed the educational motion pictures which are shown daily and more than 100 special school and college groups visited the Museum.

*Branch of Central Services.*—This Branch is responsible for the operational management of centralized duplicating, communications, employee health, photographic, warehousing and shipping, and printing and binding services for the Department, and for procurement work for the Office of the Secretary.

## Division of Budget and Finance

Sidney D. Larson, *Director*



The Division of Budget and Finance is responsible for the staff supervision of the budget, financial and investigative activities of the Department. It represents the Department in liaison with other Federal agencies and appropriation committees of the Congress. The Division consists of the Office of the Director and three branches to carry out assigned functions.

Appropriations to the Department for the fiscal year ending June 30, 1954 total \$439,283,050. Receipts for this period are estimated to be in excess of \$265,000,000.

The Division provided staff assistance in management surveys of the legal and information functions of the Department. During the year periodic reviews were made of budgetary programs to insure that programs were being executed in accordance with the purpose for which appropriated and that economies were being made where possible without adverse effect to approved programs.

Initial steps were taken to develop program schedules for the support and justification of construction estimates of the Bureau of Indian Affairs, National Park Service, and the Alaska Road Commis-



sion. Studies were continued on the advisability of the business-type budget for several of the bureaus of the Department.

The Division participated in the joint program of the Bureau of the Budget, Treasury Department, and General Accounting Office for improving accounting and fiscal reporting. Accounting surveys were instituted for National Park Service and Geological Survey with the objective of improving accounting procedures and financial reporting. Continuing assistance was provided other bureaus of the Department in accounting systems improvements and other fiscal matters. Accounting manuals were prepared and approved by the Comptroller General for the Bureau of Mines, the Office of the Governor of Alaska, and the Trust Territory of the Pacific Islands.

The Division cooperated with the General Accounting Office and with the bureaus of the Department with respect to the comprehensive audit program and provided the leadership for correcting deficiencies in fiscal and other matters brought out in the audit reports. All bureaus and offices of the Department have been placed under comprehensive audit by the General Accounting Office.

The Division conducts investigations into alleged irregularities in the performance of official duties by employees of the Department and of other matters within the responsibility of the Department. In instances where violation of criminal statutes are indicated cases are referred to the Attorney General for appropriate action. The case load for the fiscal year is as follows:

Assigned.....	39
Reported.....	34
Disposed.....	19
Pending .....	29

## Division of Management Research

Arthur B. Jebens, *Director*



The Department's objective of reducing appropriation requirements and expenditures without disrupting or impairing essential programs has given renewed vitality to the continuous search for more efficient and effective processes for conducting Departmental programs. The Division of Management Research provides facilities for coordinating

efforts throughout the Department towards the achievement of this goal.

During 1953 the Division provided assistance to the Secretary's survey teams which reviewed the major operational activities of the Department. The Division's role was twofold in that it provided personnel, as representatives of the Administrative Assistant Secretary, to participate as team members or consultants to the survey teams on administrative management matters, and also supplied the survey teams with basic source materials concerning the administrative processes under review. Subsequent to the completion of these surveys, the Division continued to provide assistance to the bureaus in the implementation of recommended improvements to assure conformance to secretarial intent and to supply leadership in the work of task groups or committees necessary to implement survey recommendations. Examples are the task groups established to study the feasibility of greater uniformity in format and other mechanics of manual preparation which were recommended in the Secretary's survey report on bureau manuals and related materials.

The Division carried on its regularly assigned functions with respect to continuing problems of organization and administrative procedures. Administrative changes necessitated by the surveys required additional assistance to the bureaus in the preparation of organization handbook changes, revisions of orders, amendments to regulations, preparation or review of legislative reports and similar matters in which the Division could offer significant help.

Attention is also directed to those projects which reflect a cross section of the Division's activities in special areas. The Division: (1) Made a preliminary study and arranged for the consolidation of the administrative services of all bureaus of the Department in Portland, Oreg.; (2) coordinated the preparation with other divisions of a special report to the Bureau of the Budget concerning a proposed reorganization affecting the functions of the Bureau of Land Management; (3) participated in and guided a committee study of machine tabulation equipment; (4) prepared detailed plans for use by the Department in performing minerals mobilization responsibility under delegation from the Office of Defense Mobilization; (5) assisted in effecting the termination of the Petroleum Administration for Defense and the Defense Solid Fuels Administration and distributing their residual functions to permanent organization units; (6) coordinated the preparation of special reports to the Senate Committee on Government Organization, the Senate Appropriations Committee and the President's Advisory Committee on Governmental Operations; (7) provided leadership and staff guidance for the Board on Manuals and Publications which was established to perform certain functions recommended in the Report on the Department's Information Program and the Review

of Bureau Manuals; (8) made a special study of the audit functions of the National Park Service.

The management improvement program continues as the yardstick by which departmental expenditures and operations are reviewed to determine if the greatest returns from program investments are being realized. Additionally, the annual comprehensive Management Improvement Report serves as one device for monitoring the progress of bureaus in the implementation of the recommendations of the survey teams.

The Department's incentive awards program was responsible for substantial monetary savings through employee efforts to increase the efficiency of their operations and cut costs. There were also intangible benefits that occurred from improved working conditions, improved safety factors and better service to the public. A summary of the Department's incentive awards activities for the 1954 fiscal year is as follows:

Number of suggestions received.....	1, 104
Number of suggestions awarded.....	414
Amount of cash awarded.....	\$17, 788
Annual savings.....	\$353, 551
Superior accomplishment awards.....	162
Leading to savings.....	10
Amount of savings.....	\$3, 654, 495
Efficiency awards approved.....	9
Annual savings.....	\$119, 202
Honor awards granted:	
Distinguished service.....	48
Meritorious service.....	94
Commendable service.....	371

## Division of Personnel Management

Guy W. Numbers, *Director*



During 1953 the Division of Personnel Management gave particular emphasis to the streamlining and improvement of bureau methods of personnel administration to complement the organization surveys made of Departmental operations. The Division's guidance was reflected in regularly scheduled meetings with bureau personnel officials and in directing attention to problem areas that required special review. The Division analyzed the implications of these reorganizations



upon such areas as the placement of career employees affected by reductions in force, reassignments or transfers necessitated by organizational changes, and the establishment of excepted positions designated as confidential or policy determining.

In the field of position classification and wage administration, particular emphasis was given to the consideration of matters related to the classification of top-level positions, liquidation of defense agencies, post audits, preparation of new position standards, territorial differentials, proposed changes in the Classification Act of 1949, and the renegotiations of amendments to existing labor-management agreements.

In the field of employment, activities included the preparation of qualification standards for positions peculiar to the Department; development of examination and test material for park ranger, park police, and motor vehicle operator positions; improvements in procedures for recruiting, transferring, and promoting employees; and the rendering of reports on compliance with Whitten Amendment provisions.

Eight junior management assistants and 15 departmental employees successfully completed the fifth departmental management training program which is designed to develop the management background of young career employees who have the potential for administrative leadership. Efforts were made to induce more effective training through line operations.

The Division continued its study of personnel issuances. In collaboration with the Board on Manuals and Publications, established by the Secretary in April 1954, the Division has been working toward the development of Departmentwide manual plans in the area of personnel administration.

A staffing standards study was initiated during the year to provide a work measurement plan to measure the ratios of personnel workers to total employees. It is anticipated that this study will assist in providing staffing guides for the Department consistent with ratios established by Congress and the Bureau of the Budget. A 10-week pilot operation of the plan in the Bureau of Mines, the Fish and Wildlife Service, and the National Park Service indicates that it may be feasible to establish such guides on a Departmentwide basis.

Seventy-five Civil Service regional inspection reports were analyzed during the year and served as an aid in the evaluation and improvement of bureau personnel operations.

Special reports were supplied to the Task Force on Personnel of the Commission on Organization of the Executive Branch and to the House Committee on Post Office and Civil Service on the leave system, the performance rating system, and supervisory development programs.

At the close of the fiscal year there were 56,831 compensated employees in the Department, a reduction of 1,896 from the previous year. Approximately 1,400 were separated by reduction in force. There were 5,486 persons employed in Washington, D. C. During the year 391 employees of the Department retired.

## Division of Property Management

N. O. Wood, Jr., *Director*



The Division continued its program of staff supervision of the Department's property management programs and gave particular attention to the solution of problems connected with improved methods of procurement, and increases in utilization of Federally owned real and personal property under the jurisdiction of the Department.

Members of the staff continued to serve on and to participate in the activities of several interdepartmental boards and committees working toward improvement of the Federal Supply System through simplified procurement and contracting practices, more accurate determination of needs, and by development of item descriptions and standards. Assignments undertaken or completed during the year included a study of needs which could be met by the Federal Prison Industries establishments, and a review of the use of electric typewriters within the bureaus of the Department.

The Division developed standards and procedures for promoting the exchange and transfer of temporarily idle equipment between projects and bureaus, and the transfer between the Department and other agencies of common-use items appearing in excess reports.

In cooperation with other interested departments and with equipment manufacturers, agenda and itineraries were arranged for a number of symposiums on motor vehicle management and care in various cities over the United States and in Alaska. It is expected that substantial benefits will accrue from these meetings in efficiency and economy. Existing regulations concerning use of passenger vehicles on official business were extended to cover all other types of motor vehicles.

In discharging its responsibility for real property in its care, the Department undertook the task of inventorying all real estate holdings

other than the public domain, and improving the official records relating to each parcel of real property. During 1954, negotiations were successfully conducted with General Services Administration to transfer to the Department a number of parcels of entrusted real property now in use as parks or for recreational purposes, and action was completed on the transfer of Angel Island in San Francisco Bay to the Department of Defense for military use.

Cooperation of the Division was extended to various task groups and representatives of other agencies studying the methods and results of operations conducted by the Department. Among the practices reviewed were those of commercial-type activities, real property controls, inventory practices, and traffic management.

In the accomplishment of its records management function, a revised and simplified Correspondence Handbook was developed and issued; its more simple format and more effective distribution are expected to achieve significant gains in efficiency. Records Control Schedules providing for more uniform and prompt disposition of inactive records were developed and put into use in all but two bureaus. Transfers of inactive records to Federal Records Centers continued satisfactorily.

During the year, 243 radio-frequency assignments, authorized by or coordinated with the Interdepartment Radio Advisory Committee, were issued by the Department to provide for the radio-communication requirements of the various offices and bureaus of the Department. A total of 369 notifications of frequency assignment were sent to the International Telecommunication Union for the registration of Interior radio stations. The departmental basic plan for project CONELRAD (control of electromagnetic radiation) was prepared, approved, and promulgated.

## Division of Security

J. Cordell Moore, *Director*



In the first full fiscal year of its operation the Division of Security assumed responsibility for setting in motion a completely new security program. During the year regulations were issued with respect to personnel security, as set forth in Executive Order 10450; and physical



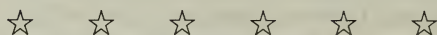
security, in accordance with requirements of Executive Order 10501.

A large number of positions were declared sensitive under the above program and, at the end of the fiscal year, over 95 percent of the investigations had been completed and clearances issued. The re-adjudication of certain types of cases, in accordance with newly issued personnel security regulations, were approximately 85 percent completed by the year's end. Closer control has also been established over classified material in the Department.

In the field of physical security and Civil Defense the Division has made notable progress in preparing the Department for any emergency which may arise. With the end of the fiscal year, the Division began a second phase of the overall security program, with particular emphasis on establishing an improved system of security records, and safeguarding information affecting the national security.

# Office of the Solicitor

Clarence A. Davis, *Solicitor*



IT is believed that this year represents a great step forward in the administration of the legal affairs of the Department. A complete reorganization has been made effective.

For many years each of the various bureaus of the Department have had a separate legal staff with a chief counsel and subordinates, all of whom were responsible primarily to the heads of the bureaus as administrative officials, and none of whom was administratively responsible to the Solicitor, despite the fact that the Solicitor has been designated by law as counsel to the Secretary and head of the legal department. The result has been for many years a lack of coordination of the work of the bureaus, conflict of legal opinions between various bureaus, and a lack of authority in the Solicitor over the administration of the legal affairs of the Department, despite the responsibility imposed upon him by law.

This situation has been the subject of criticism by various Solicitors of the Department for many years.

This administration caused a complete survey of the legal affairs of the Department to be made by a survey team headed by counsel thoroughly familiar with the handling of nationwide legal affairs. That survey team recommended that all the legal work of the Department stem from the Solicitor's Office, and that all bureaus and agencies of the Department rely upon the Solicitor's Office for legal advice.

The matter was presented to the Houses of Congress, who accepted the plan, and as a result transferred to the Solicitor's Office all appropriations for legal services previously made to the various bureaus. Following this action all attorneys in the Department were transferred to the payroll of the Solicitor, and a vertical line of authority established from the Solicitor through a deputy solicitor through six associate solicitors, designated as follows: (1) Public Lands, (2) Mineral Resources, (3) Territories, Wildlife, and Parks, (4) Indians, (5) Reclamation and Power, (6) Appeals.

Important legal matters arising in the various bureaus of the Department will clear through associate solicitors, and by the establishment of close contact between the various associates it is felt that uniformity of opinion will be achieved and that the legal staff will be

free to express legal opinions without administrative domination. This action further restores the lawyers of the Department to an independent status as professional people, was cordially welcomed by most of the lawyers of the Department, and resulted almost immediately in a more free exchange of ideas and a great improvement in morale. It further negatives over-specialization and makes possible a more friendly interchange of work load. All of the lawyers of the Department in Washington are now housed in units of the Solicitor's Office rather than isolated in particular bureaus as heretofore.

The same principle will be carried into the field, with the establishment of regional solicitors in some 5 or 6 areas, with all lawyers in that area, regardless of their assignment respecting the work of the bureaus, responsible to the regional solicitor and not to administrative agencies.

A survey of the more important matters handled in the Solicitor's Office during the year follows:

## CONTRACT APPEALS

At the beginning of the fiscal year, 33 contract appeals were pending. During the year, final action was taken on 28 appeals, and 45 cases were pending at the end of the year. Initial steps were taken in the preparation of rules of procedure to govern contract appeals in the Department.

Among the more important matters in this category were the following:

*Boespflug-Kiewit-Morrison*, CA-175 (August 21, 1953). When the terms of a change order have not been followed, so that the payment of the stated lump sum for the work specified in the order, based on unit prices listed therein, would result in an overpayment to the contractor for the work actually performed by it, an appraisal of the entire work under the change order should be made and a new change order issued which will make an equitable adjustment for the type and amount of work actually done.

*Bury Compressor Company*, CA-189 (October 19, 1953) and *Timber Structures, Inc.*, CA-200 (October 14, 1953). Under the "Delays-Damages" clause in the specifications of a standard Government supply contract, delays in transit of supplies ordered by the contractors were in the particular circumstances a ground for an extension of time to perform the work covered by the contracts.

*John L. Herrmann & Associates, Inc.*, CA-194 (July 13, 1953) and *Mac Exploration Company*, CA-202 (December 16, 1953). These two appeals resulted from a notice of termination of Government contracts by the contracting officers. In the *Herrmann* appeal the



action of the contracting officer in terminating a contract for the production of a documentary film of the shrimp fishing industry was upheld primarily because the film did not meet adequate standards and its completion had been delayed far beyond the date fixed in the contract. In the *Mac Exploration Company* appeal, the notice of termination in a core drilling contract was not sustained when the breach of contract was partial and immaterial, and the contracting officer had erroneously required the contractor, at the risk of having the contract terminated, to recondition the hole by a specified date.

## CLAIMS

At the beginning of the fiscal year, 43 tort and irrigation claims were pending. During the year, a total of 100 claims involving damage to property or personal injury were decided. In addition, final action was taken on 21 appeals from determinations of field attorneys. At the end of the year, 37 claims were pending. Among the more important determinations of tort claims were the following:

*Emard Packing Company*, T-545 (August 25, 1953). When a train car of The Alaska Railroad ran off a spur track belonging to the railroad and damaged a private dock, the doctrine of *res ipsa loquitur* applied.

*Guy P. Kearns*, T-548 (October 21, 1953). A trespasser cannot recover for damage to personal property that results from the defective condition of a crane of which the Government operator was unaware.

*Leroy Gienger*, T-549 (Revised) (April 20, 1954). The Government is liable in tort under the law of a State imposing absolute liability for damage caused by blasting.

Among the more important determinations of irrigation claims were the following:

*County of Natrona, Wyoming*, T-512 (Ir.) (December 30, 1953), granting relief for damage to a public highway bridge due to extraordinary use in the construction of an irrigation project.

*Mrs. Bertha Theobald*, T-569 (Ir.) (June 30, 1954), making an award for property damage resulting from seepage through the pervious banks of a natural stream utilized for irrigation purposes in conformity with State law, without alteration of the existing channel or in excess of its established maximum capacity.

*Chicago, Burlington & Quincy Railroad Company*, T-599 (Ir.) (June 23, 1954), making an award for the cost of repairs required to assure the safety of a railroad bridge, in view of the contractual obligation of the Government to take precautions to prevent damage.

## INDIAN AFFAIRS

Three appeals were pending at the beginning of the fiscal year. During the year, 22 appeals were decided, and 13 were pending at the close of the year. The following opinions indicate some of the more important matters handled during this period:

M-36175 (July 30, 1953). Indian allotted and tribal lands may not, under existing law, be included, with or without the consent of the Indians, in State irrigation districts which would have the power to operate and maintain the Indian projects serving such lands, and to assess such lands for irrigation charges, even under contracts which would not permit the irrigation districts to resort to foreclosure proceedings in State courts to enforce the collection of such charges.

M-36164 (September 10, 1953). Since the law of the State of Arizona regulating the withdrawal of ground water cannot be applied to Indians on Indian reservations in the absence of congressional legislation specifically making such law applicable, the State law may not be extended to Indian reservations by agreement of the Department, Bureau of Indian Affairs, and Indian tribal councils.

M-36197 (December 31, 1953). The Congress may terminate Federal supervision and control over Indian property. Such termination would ordinarily carry with it the subjection of the property to State taxation even without a declaration to that effect by the terminating legislation. However, Indians allotted under the General Allotment Act, either on their reservations or on the public domain, in the context of a treaty scheme or agreement, express or implied, enjoy vested rights to the exemption of their lands from taxation not only during the original trust period but also during extensions of such trust period, and such rights may not constitutionally be terminated by the Congress.

M-36148 (February 3, 1954). The Secretary of the Interior may acquire by condemnation lands on the Crow Indian Reservation in Montana needed for a reclamation project.

M-36184 (February 15, 1954). The Secretary of the Interior may not issue patents in fee to individual Indians unless the allottees or their heirs have applied for them. The Secretary's authority is discretionary so that he might legitimately take into account factors other than competency of the Indian in determining whether a patent in fee should issue. Where an Indian to whom a trust patent has been issued under the General Allotment Act receives a patent in fee for the whole of his allotment, he becomes subject to the laws, both civil and criminal, of the State of his residence.

M-36200 (February 12, 1954). The lands of the Colorado River Indian Reservation are held in trust by the United States for the benefit of the members of all tribes of the Colorado River and its

tributaries who have been or who may be located thereon under Federal authority. An ordinance of the Colorado River Indian Tribal Council, which permitted the settlement on the reservation of Navajo and Hopi Indians, constituted a valid and enforceable agreement on the part of the United States Government.

## PATENTS

Early in the fiscal year, the Department of Justice discontinued its practice of prosecuting patent applications on behalf of the Department of the Interior on a regular basis, and returned all cases upon which patent applications had not been filed. The responsibility for the prosecution of applications, accordingly, has devolved upon this office. In addition to this work, six opinions relating to employee rights in inventions were prepared.

## PUBLIC LANDS

Three hundred thirty-one appeals in public-land matters were pending at the beginning of the fiscal year. During the year, 338 appeals were decided, and 214 were pending at the close of the year. Among the more important decisions on appeals were the following:

*Emmet F. Spencer et al.*, A-26620 (August 13, 1953). A petition for the approval of an assignment of a potash permit, which reserves or creates overriding royalty obligations, should not be approved unless, on the basis set forth in 43 CFR 194.27a, they are subject to reduction to not less than a total of one percent of the gross value of the output at the point of shipment to market whenever, in the interest of conservation, it appears necessary to do so in order to obtain the greatest ultimate recovery.

*Martin J. Plutt, Ellen E. Hosley*, A-26723 (August 17, 1953). Where the owner of land contiguous to an isolated tract of public land offered for sale properly asserts a preference right to purchase the land, and then disposes of the contiguous land after the close of the period allowed for the assertion of preference-right claims and before he receives a cash certificate or patent for the isolated tract, he does not thereby lose his preference right to buy the isolated tract.

*Emery E. and Beulah M. Arbaney et al.*, A-26942 (December 16, 1953). When any evidence appears in a proceeding for a public sale under 43 U. S. C., sec. 1171, as amended, which indicates that prior to the sale the interested parties, or some of them, may have arrived at or attempted to arrive at an agreement not to bid against each other, doubt is cast upon the validity of the proceedings and it is necessary to vacate the sale.



*Takako Fujimura*, A-26798 (December 18, 1953). Where the Department has held that a noncompetitive oil and gas lease, which is later canceled, was fraudulently obtained, an application for the repayment of the advance rental must be denied. The fraudulent acts of the lessee's agent acting within the scope of his employment, whereby an oil and gas lease is fraudulently obtained, are chargeable to the lessee, whether or not he knew of the fraudulent acts.

*Sam D. Rawson*, A-26800 (December 18, 1953). A material site permit which was regularly issued under the Federal Highway Act to a State agency precludes the subsequent location of a placer mining claim on the same land. Where a highway being built under that act is approximately 2 miles distant from the public land covered by the permit, a determination that the land is "adjacent" to the road within the meaning of section 17 of the act is not unreasonable.

*Arthur L. Wingard et al.*, A-26977 (June 3, 1954). Where land is classified, pursuant to a State's application to select land for internal improvement, as suitable for disposition as a State selection and is later classified as suitable for disposition as small tracts, the preference right given the State by section 7 of the Taylor Grazing Act prevails over the preference given by the Veterans' Preference Act to veterans who file small-tract applications after the State's application and after the small-tract classification.

*Herbert R. Lewis, Charlotte L. Murphey*, A-26819 (June 30, 1954). In the absence of an appeal to the Secretary of the Interior the Director of the Bureau of Land Management may, on his own motion, reconsider a decision previously rendered by him and correct any errors which may have been made in the former decision. When an appeal is taken to the Secretary from a decision of the Director of the Bureau of Land Management, the Director loses his jurisdiction in the matter and may not, thereafter, in the absence of authority from the Secretary, render a supplemental decision in the matter.

Solicitor's opinion M-36187 (November 12, 1953) held that to qualify to buy a 5-acre tract in Alaska as a home or headquarters site under the first proviso of section 10 of the act of May 14, 1898, as amended, the claimant must be engaged in trade, manufacture, or other productive industry but need not carry on his trade or other occupation on the tract. In M-36178 (January 5, 1954, as supplemented March 4, 1954) the view was expressed that an application made by a State to exchange lands outside of a grazing district pursuant to section 8 (c) of the Taylor Grazing Act, as amended, is not subject to the classification authority of the Secretary of the Interior under section 7 of the act and that a State exchange application may not be rejected merely because the lands selected may have been classified pursuant to section 7 as being suitable for disposition under another of the public-land laws.

The office participated in the preparation of regulations, which were

issued during the fiscal year, under the Outer Continental Shelf Lands Act. This act deals with the natural resources in submerged lands lying outside the boundaries of the States.

## GENERAL

As in the past, the office was called upon to review, or to give opinions upon, many matters arising out of the operations of the various bureaus or relating to the general administration of the Department. Twenty cases involving investigations of alleged misconduct on the part of employees of the Department were reviewed, and a member of the office served as departmental legal security officer. Legal work required in connection with the responsibilities of the Secretary of the Interior relating to the Defense Production Act of 1950, industrial mobilization, and post attack rehabilitation was performed by the office, which also handled the legal work connected with the saline water program. Legal assistance was provided in connection with the sale to private interests by the Virgin Islands Corporation of the Bluebeard's Castle Hotel.

## LEGISLATION

The fiscal year 1954 included the final portion of the first session of the 83d Congress and the initial portion of the second session. The following statutes of major importance to the Department of the Interior were enacted during the fiscal year :

Public Law 159 (67 Stat. 227) liberalizes the Color of Title Act, a statute under which persons who have occupied public lands during a long period of years, in reliance upon a purported claim of title, can obtain ownership of the lands they have so occupied.

Public Law 212 (67 Stat. 462), the Outer Continental Shelf Lands Act, establishes a comprehensive system of law to govern the exploration, development, and utilization of the natural resources on or within the submerged lands of the Continental Shelf outside the boundaries of any of the States.

Public Law 230 (67 Stat. 495) contains a number of "house-keeping" authorizations designed to facilitate the efficient operation of the National Park System.

Public Law 250 (67 Stat. 539) provides for the validation of a large number of mining locations made under the United States mining laws on lands that were closed to location under those laws either because the lands were subject to outstanding mineral leases or applications for such leases, or because the lands were known to be potentially valuable for oil and gas.

Public Law 258 (67 Stat. 566) modernizes the law governing the exchange of farm units on Federal reclamation projects.

Public Law 277 (67 Stat. 586) repeals entirely the portion of the so-called Indian liquor laws which prohibited the sale of intoxicating liquor to Indians at any place in the United States outside the boundaries of the Indian country and modifies the portion of those laws which prohibits the introduction or possession, or the sale to either Indians or non-Indians, of intoxicating liquor within the boundaries of the Indian country by providing that these restrictions shall not apply to any transactions in intoxicating liquor that are in conformity both with State law and with duly adopted Indian tribal ordinances.

Public Law 280 (67 Stat. 588) declares that the Indians in the States of California, Minnesota, Nebraska, Oregon, and Wisconsin (except the Red Lake Indians in Minnesota, the Warm Springs Indians in Oregon, and the Menominee Indians in Wisconsin) shall be subject to the general criminal and civil jurisdiction of the courts of those States, and that these Indians shall be subject to the criminal laws of the five States, and to such of their civil laws as are of general application to private persons or private property. The act qualifies the authority it confers on the States by clauses protecting Indian rights in trust and restricted Indian property, and preserving a limited measure of self-government in the Indian tribes.

Public Law 340 (68 Stat. 57) liberalizes the statutes relating to the grants of public lands for school purposes by permitting the States to obtain title to school sections that are covered by a mineral lease or an application for a lease, at the time of their survey.

Public Law 387 (68 Stat. 173) establishes general procedures for the disposition, by sale or lease, of public lands that are needed for State or local public purposes to any governmental body or nonprofit organization that is prepared to put these lands to use for an established or definitely proposed public project.

Public Law 390 (68 Stat. 239) makes several important revisions in the Small Tract Act, a statute that permits the sale or lease of public lands, in tracts not exceeding 5 acres, for residence, recreation, or business purposes.

Public Law 399 (68 Stat. 250) is designed to bring about the orderly termination of Federal supervision over the Menominee Indians of Wisconsin.

Public Law 402 (68 Stat. 253) grants to veterans of the Korean conflict the same privileges with respect to homestead and other public land entries as are enjoyed by veterans of World War II.



It also extends the period of time during which veterans are to have a preference in making such entries until September 27, 1959, and requires cultivation of veterans' homesteads.

Public Law 426 (68 Stat. 270) settles a long-standing controversy concerning the legal status of certain O. & C. lands in Oregon and permits the release of impounded funds to certain counties in that State.

Public Law 451 (68 Stat. 330) and Public Law 229 (67 Stat. 494) clarify the authority of the President to establish local executive, legislative, and judicial agencies in the Trust Territory of the Pacific Islands and the authority of the appropriate committees of the Congress to report appropriations for the conduct of necessary governmental activities in the trust territory.

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