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REPORT ON GOVERNMENT ASSISTANCE

to the Atomic Energy Industry

Prepared by
The Atomic Energy Commission

At the Request of
The Joint Committee on Atomic Energy

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REPORT ON GOVERNMENT ASSISTANCE TO THE ATOMIC ENERGY INDUSTRY
PREPARED BY THE ATOMIC ENERGY COMMISSION AT THE REQUEST OF THE
JOINT COMMITTEE ON ATOMIC ENERGY

By letter dated February 28, 1962, Chairman Holifield of the Joint Committee on Atomic Energy informed the Chairman, U. S. Atomic Energy Commission, of the Committee's plan to undertake a study of the types of subsidies or assistance, both direct and indirect, which occur in the atomic energy program and particularly the atomic power program. He proposed that the study be carried out in three phases:

1. Identify all possible subsidies.
2. Estimate, within reasonable parameters, the monetary value of each type of subsidy.
3. Consider the pros and cons or merits of each type of subsidy and whether it is serving as a proper and effective purpose in the program.

The letter also suggested that the first phase be developed by meetings of the Joint Committee staff and the AEC staff. After agreement on the first phase, a report was to be requested from AEC to serve as the basis for the second and third phases. A copy of the letter was sent to the Comptroller General of the United States with the request that appropriate staff members of the General Accounting Office be made available to participate in the study.

Subsequent meetings among representatives of AEC, GAO, and the Joint Committee staff resulted in understandings of the coverage and types of information desired by the Joint Committee in the AEC report. A number of items and related estimates of monetary values were added to the report at the request of the Joint Committee staff, pursuant to Chairman Holifield's letter of April 13, 1962 and its attachment. Although the Joint Committee initially requested that the study encompass subsidies in the atomic energy program, as a result of subsequent discussions with the JCAE staff it was decided that the study should encompass all Government direct and indirect assistance to the atomic energy industry.

After completion of the first phase (identification of possible areas of Government assistance) and AEC's preparation of a revised draft report giving effect to comments and suggestions in the attachment to Chairman Holifield's letter of April 13, 1962, further meetings were held among representatives of AEC, GAO, and the Joint Committee staff to review the revised draft report.

It should be noted at the outset that a study of this nature involves many judgment factors in determining both the types of items to be included and the estimates of monetary value. It is recognized that some of these judgments, assumptions and estimates are subject to wide differences of opinion. Every effort, however, has been made to make this report objective, complete, factual and responsive to Chairman Holifield's request. In this regard the independent views of representatives of the Joint Committee staff and the GAO, brought to bear in their comments and suggestions made at our several meetings, have been particularly helpful and valuable.

This report has been prepared in two parts, A - Financial Assistance (Page 4) and B - General Assistance (Page 23) as defined below. Each part contains discussions of the types of assistance and includes estimates of costs or monetary values where possible, based on the best information available when the study was made. This report does not include the third phase of the study relating to the pros and cons or merits of each type of assistance.

A. Financial Assistance to the atomic energy industry is defined as that assistance provided by AEC programs and general government legislation that lessens the financial requirements of industry, directly or indirectly, in the development, construction and operation of atomic energy facilities. It includes government sponsorship of cooperative programs for the development, construction and operation of power demonstration reactors; the providing of services, and research and development; and the waiver of use charges. In addition, financial assistance is provided by the purchase of special nuclear materials produced by industry as required by the Atomic Energy Act of 1954, as amended. Also, we have considered the financial benefits resulting from government ownership and lease of special nuclear material, and the establishment of charges based on full recovery of government costs which include provisions for self-insurance and low interest rates but not allowances for taxes and profit.

A summary of estimated financial assistance through fiscal year 1963 is presented in Attachment A, page 22.

B. General Assistance to the atomic energy industry is defined principally as the vast fund of scientific and technological information that has become available as a result of AEC's research and development-type activities. This assistance is one of the products of the government program for the development, use, and control of atomic energy so as to make the maximum contribution to the common defense and security, to promote world peace, improve the general welfare, increase the standard of living and strengthen free competition in private enterprise. The estimates of the costs of this government program represent operating and plant costs of all AEC research and development-type activities (exclusive of weapons program R&D and the specific costs included in Part A) as well as the expenditures of other Federal agencies relating to atomic energy applications.

A summary of the estimated costs of government research and development-type activities through fiscal year 1963 is presented in Attachment B, page 36. Except for the Reactor Development Program, however, no monetary value has been estimated for the general assistance to the atomic energy industry.

PART A

FINANCIAL ASSISTANCE BY GOVERNMENT TO THE ATOMIC ENERGY INDUSTRY

OUTLINE

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PART A

1. Introduction

There are a number of ways in which financial assistance by the government has been provided to the atomic energy industry. In the nuclear power industry such incentives are needed to obtain industrial participation in specific power projects.

Research and development assistance is provided for specific cooperative power demonstration projects. For the cooperative public power projects AEC has constructed and retained title to the reactor portion of the plants.

Financial assistance relating to important parts of nuclear fuel cycle costs have been provided. The major segments of fuel cycle cost consist of conversion and U-235 enrichment services, fuel fabrication services, U-235 burnup or consumption charges, the chemical reprocessing of irradiated fuels, carrying charges on fuel inventory, and a credit for plutonium or other special nuclear materials produced.

Since the law requires government ownership of special nuclear materials and enriched uranium is available only from the government, this material is leased and a use charge of 4-3/4% of its value (based on a published schedule of charges) is made to all licensed users. Also, plutonium or other special nuclear material produced in licensed reactors is purchased by the government since the technology for its use in fuels has not been fully developed.

Assistance in fuel cycle costs consist of (1) waiver of use charges during the period of R&D and an initial period of operation, (2) guaranteed charges for irradiated fuel processing, and (3) guaranteed prices for Pu and U-233 produced.

This Part A discusses each of the foregoing types of assistance as well as other types of financial assistance and economic incentives to other segments of the atomic energy industry.

2. Waiver of Use Charges

Use charges are waived on special nuclear materials and heavy water required for privately-owned cooperative power reactor development projects within maximum limitations. The estimated total amount of the use charges to be waived on all projects currently under contract is $14.6 million, of which $3.3 million had been accrued through June 30, 1961. Details by projects are shown on page 7. The estimated amount through fiscal year 1963 is $8.1 million.

3. Research and Development Assistance - Privately-owne Cooperative Power Demonstration Projects

Research and development assistance is provided for specific privately-owned cooperative power reactor development projects. This research and development work applies directly to the materials, components and fuel to be used in the construction and operation of each of the power demonstration reactors. Examples of the types of R&D tasks are fuel element design and development, critical assemblies, test irradiations, control and safety systems, and materials of construction. Some of the research and development work is performed in AEC-owned laboratories and some is performed in privately-owned facilities. It includes development work necessary prior to the completion of the design, construction and operation of the reactor, and in some cases, to improve operations in the post-construction period. Consideration is being given to other forms of assistance such as plant design and additional post-construction R&D.

The estimated total research and development assistance to be given for these projects amounts to $49.9 million of which $34.0 million had been incurred through June 30, 1961. These amounts are excluded from the reactor development costs given in Part B of this report. Details by projects are shown on page 7. The estimated total through fiscal year 1963 is $41.3 million.

4. Construction of AEC-Owned Power Demonstration Reactors

The total estimated plant costs of the six currently approved AEC-owned reactors under cooperative arrangements with industry is $127.1 million. Under these arrangements the utility provides the electric generating plant and generally pays for steam at a rate equivalent to the cost of comparable steam produced from conventional sources. The AEC generally provides for the necessary R&D, construction of reactor, fuel fabrication and all or a share of reactor operating costs during the first five years of operation.

The utility has an option to purchase the reactor plant at the end of the contract term. Generally, the contracts provide for the sale of the reactor plant at the end of the contract period, at a price to reflect appropriate depreciation but not to include construction costs assignable to research and development. Also, the contracts provide for dismantlement or abandonment of the reactor plant at the Commission's option, but that the government shall not be required to restore or defray expenses of restoring or rehabiliting the land to its original condition.

Estimated Total Costs of Privately-Owned
Cooperative Power Demonstration Projects

	Cumulative Costs thru 6/30/61		Estimated Total Costs	
	AEC	Participant	AEC	Participant
	(in millions)			
Yankee Atomic Electric Co.				
Research & Development	$ 4.9	$ 0.2	$ 5.0	$ 0.2
Plant & Fuel Fabrication	-	40.7	-	40.7
Waiver of Use Charges	1.0	-	3.7	-
Totals	5.9	40.9	8.7	40.9
Power Reactor Development Co.				
Research & Development	2.6	20.7	3.6	23.4
Plant & Fuel Fabrication	-	58.6	-	62.6
Waiver of Use Charges	1.9	-	3.7	-
Totals	4.5	79.3	7.3	86.0
Northern States Power Co.				
Research & Development	5.9	0.2	8.3	0.2
Plant & Fuel Fabrication	-	14.4	-	26.1
Waiver of Use Charges	0.3	-	1.8	-
Totals	6.2	14.6	10.1	26.3
Carolinas-Virginia Nuclear Power Association, Inc.				
Research & Development	6.9	0.9	13.9	1.9
Plant & Fuel Fabrication	-	5.2	-	21.3
Waiver of Use Charges	-	-	1.2	-
Totals	6.9	6.1	15.1	23.2
Consumers Power Co. of Mich.				
Research & Development	1.2	-	4.6	0.2
Plant & Fuel Fabrication	-	10.6	-	29.4
Waiver of Use Charges	-	-	1.7	-
Totals	1.2	10.6	6.3	29.6
Philadelphia Electric Co.				
Research & Development	12.5	1.5	14.5	6.9
Plant & Fuel Fabrication	-	3.1	-	30.2
Waiver of Use Charges	0.1	-	2.5	-
Totals	12.6	4.6	17.0	37.1
Summary				
Research & Development	34.0	23.5	49.9	32.8
Plant & Fuel Fabrication	-	132.6	-	210.3
Waiver of Use Charges	3.3	-	14.6	-
Totals	$37.3	$156.1	$64.5	$243.1

Within a reasonable time after abandonment, the Commission is obligated to take such action as it may deem necessary to make the reactor site useful without undue danger to the public's health and safety. Exceptions to these general provisions are found in the contracts with Duquesne Light Company, Consumers Public Power District, and Puerto Rico Water Resources Authority.

The Duquesne contract has no provision for the sale of the AEC-owned portion of the plant. However, the contract does provide, at the option of AEC, for the lease of the turbine generator portion of the plant from Duquesne. Upon expiration or termination of the lease, AEC may remove any or all Government-owned portions of the PWR Plant, facilities, components, or equipment. If this right is not exercised within two (2) years, such items (except source and special nuclear materials) become the property of Duquesne without cost.

The Consumers Public Power District contract does not provide a specific basis for determining a sales price but suggests that consideration will be given to the total project cost of Consumers, including fixed charges on Consumers' capital investment for operation of overall facilities.

The Puerto Rico Water Resources Authority contract states that "the Commission will, to the extent permitted by applicable law, offer the reactor plant owned by the government for sale to the contractor at such prices as may be agreed upon by the parties."

A summary of estimated plant costs by projects is shown on page 9.

5. Irradiated Fuel Processing

In 1956, a potentially serious obstacle to construction and evaluation of reactor projects existed since chemical processing services were neither available commercially nor available at known charges from the AEC. To remove these unknowns in the evaluation of reactor projects, the AEC announced in 1957 that it would provide for processing of irradiated fuels from licensed reactors and would make financial settlements based on guaranteed charges for chemical processing. This commitment continues in effect until fuel element processing services are commercially available at reasonable prices or June 30, 1967, whichever it earlier.

Estimated Plant Costs for AEC-Owned Power Demonstration Reactors

	Cumulative Costs thru 6/30/61		Estimated Total Costs	
	AEC Reactor Plant	Participant General Plant	AEC Reactor Plant	Participant General Plant
	(In millions)			
Duquesne Light Co. Shippingport, Pennsylvania	$49.2	$25.3 a/	$58.9	$25.3 a/
Rural Cooperative Power Assn. Elk River, Minnesota	8.1	1.6	9.0	1.6
City of Piqua Piqua, Ohio	6.3	3.8	8.1	3.9
Consumers Public Power District Hallam, Nebraska	25.6	18.1	30.8	20.6
Puerto Rico Water Resources Auth. Punta Higuera, P. R.	3.6	1.3	9.8	4.0
The Dairyland Power Cooperative Genoa, Wisconsin	-	-	10.5	7.8
	$92.8	$50.1	$127.1 b/	$63.2

a/ Includes $5.0 million expended by Duquesne for part of reactor plant.

b/ This amount may be reduced by proceeds from future sales of plants.

The guaranteed charges for chemical processing of the irradiated fuel elements were based upon estimated government costs of constructing and operating a conceptual plant since no existing facility had the capability to reprocess the variety of fuels expected to be forthcoming from reactors in this country. The cost estimates were derived from actual experience relevant to construction and operating costs in AEC plants and were applied as if such a conceptual plant were built adjacent to an AEC site and operated by the AEC. The cost of initial waste storage tankage was included in the charge for chemical processing. However, the cost for replacement of waste storage tanks and perpetual custody of the waste was not included. The guaranteed charges for irradiated fuel processing services also provide for cost escalation increases on the basis of recognized indices.

In order to accommodate non-production fuels, AEC obtained authorization for Project No. 59-a-1, "Plant Modifications for Processing Non-Production Spent Fuels." Originally the assignment of the various fuels would have required modifications of separations facilities at Oak Ridge, Hanford, Idaho and Savannah River, and research and development effort and design of facilities were initiated at these sites. Subsequently, reviews of various alternate plans for processing the non-production fuels resulted in a realignment of processing responsibilities to Idaho and Savannah River in order to achieve the most economical assignment. This resulted in the phasing out, at a cost of approximately $870,000, of the design effort initiated at Oak Ridge, Hanford and also Idaho, where it appeared that existing facilities could handle the highly-enriched fuels assigned to that site. It was decided that, pending private industry's determination to enter the fuel processing field, Savannah River would provide a facility only for the receipt and storage of assigned fuels. This facility, estimated to cost $3,100,000, is scheduled for beneficial occupancy about November 1962. In addition to handling the power reactor fuels, the scope of the receiving facility includes the capability of handling shipments from AECL, the fuels from SRP Heavy Water Component Test Reactor and repackaging of ruptured elements from SRP's production reactors.

Thus far, the AEC does not possess a capability in its facilities for processing all non-production fuels from licensed reactors, although some limited capability exists for some of the fuels containing highly enriched uranium; however, no

licensee fuels have been processed to date. Therefore, no actual experience exists upon which to make a determination relative to financial assistance provided to the atomic energy industry in this area.

The AEC has an open invitation to industry to submit proposals for providing the radiochemical processing services in privately-owned facilities. The AEC has stated that it would consider making available an AEC base processing load to a private processor if such support is required to assist in the construction of a private plant. The Davison Chemical Company has submitted a preliminary proposal to provide commercial irradiated fuel processing services and their proposal is currently being considered by the AEC.

The Davison proposal for the processing of power reactor fuels is not yet sufficiently definitive to permit a comparison of probable reprocessing costs with the government processing charges.

6. Low-Level Waste Disposal

In December 1959, the Commission approved a policy "that permanent land disposal sites be established on a regional basis on government-owned land, either Federal or State." It was felt that placement of the radioactive wastes in government-owned lands under long-term government control would assure adequate protection of the public health and safety throughout the period of any potential hazard.

In May 1960, the Commission designated the waste burial grounds at Oak Ridge and Idaho as interim land burial sites for low-level solid radioactive wastes pending an overall study of requirements for additional regional facilities and the evaluation of specific sites to fulfill such requirements. These two sites immediately became available to all AEC licensees for disposal of their radioactive wastes, suitably packaged and delivered to the site. Charges for this service was set at 70¢ per cubic foot of packaged waste with a minimum charge of $21.00. The 70¢ charge was developed on the basis of estimated full cost recovery studies for the Oak Ridge and Idaho burial grounds being established and operated for 20 years, and custodial and maintenance costs thereafter. The estimate of revenues from this service through June 30, 1963 is $200,000.

7. Guaranteed Fair Prices for Pu and U-233

Guaranteed fair prices for Pu delivered by licensees in the U. S. prior to June 30, 1963 ($45.00 to $30.00 per gram for specified assays through

June 30, 1962; otherwise $30.00 per gram) have been based on intended use as weapons material. Estimated payments for Pu through fiscal year 1963 range from $4.5 million to a maximum of $5.7 million. Guaranteed fair prices for U-233 ($15.00 per gram as nitrate) and U-233-235 mixtures apply to deliveries prior to June 30, 1963, but it is estimated that no such deliveries will be made in this time period. The Commission is considering the establishment of prices for these materials for periods subsequent to fiscal year 1963 based on the estimated fuel value.

The $12.00 fuel price applicable to Pu metal produced abroad from U.S.-supplied U-235 and delivered prior to June 30, 1963 was based on the estimated fuel value in thermal reactors in relation to the cost of using enriched uranium. Total overall Pu purchase commitments authorized under the Euratom program are 4,100 kgs. maximum. The total for the only Euratom project thus far authorized (Ssnn) is 615 kgs. maximum. There are no purchase commitments, other than in Euratom, in the AEC international program.

The technical feasibility of using plutonium as a power reactor fuel has been demonstrated in the operation of Clementine in 1951 and more recent operation of LAMPRE in 1961. As part of AEC's intensified effort to develop practicable plutonium fuels, samples have been and are being tested in various reactors such as the EBR-1, MTR, ETR and GETR and plutonium-bearing fuels are currently being used in the Plutonium Recycle Test Reactor (PRTR).

The economics of using plutonium fuel in central station size nuclear power plants have not yet been demonstrated to be practical. However, the U.S., France and U. K. are in agreement that the use of plutonium as a power reactor fuel is becoming of increasing importance.

The effect of various plutonium prices on estimated future costs of power, in mills per kwh, from thermal power reactors is shown below:

Pu Price, $/g Metal	Estimated Reduction in Cost of Power - mills/kwh (range)
$ 9.50	0.5 - 0.8
12.00	0.7 - 1.0
30.00	1.7 - 2.5

8. Charges for Plutonium and U-233 Leased

There are currently two base charges for plutonium; one for research and development activities and the other for commercial-industrial use. The former is currently set at $12.00 per gram of metal. The latter is set at the guaranteed fair prices ($45 to $30 per gram for specified assays through June 30, 1963; otherwise $30 per gram), for the period beginning January 1, 1961 and ending June 30, 1963. A base charge of $15.00 per gram of nitrate has been set for U-233 for research and development uses. Base charges provide the dollar value against which use charges are assessed.

The charges were established on the principle that charges for materials distributed should be the same as the established prices for the same materials produced by licensees. The lower plutonium charge for research uses was intended to encourage research and development on the utilization of this material in industry. The higher plutonium charge for commercial-industrial use is considered reasonable.

The principal commercial-industrial use of plutonium to date is in plutonium-beryllium neutron sources used for purposes such as oilwell logging. The existence of a supply of plutonium at a reasonable charge provides a useful and unique tool to industry at a cost that promotes its use.

Although these materials have been leased in advance of initial purchases from industry, it is expected that future purchases will exceed quantities leased. The only materials presently available for lease were produced in AEC production reactors. Prices could not be based on costs, however, because such costs are classified, restricted data.

The quantities and dollar values of these materials leased as of June 30, 1961, based on the published schedule of charges, are as follows (excludes other Federal agencies):

	Kgs.	Total Value (in thousands)
Plutonium *	27.38	$821.4
U-233	25.80	386.9

* All but 1.2 grams are leased for commercial use in neutron sources.

The leasing of these materials at the 4-3/4% use charge vs. private financing with carrying charges from 9% to 12% provides annual assistance ranging from $51.3 to $87.6 thousand.

9. Leasing of Enriched Uranium

The schedules for charges for enriched uranium have been developed to assure recovery of full costs of the government, and use charges for materials leased are based on average government interest rates on long-term borrowings, plus an allowance for servicing.

Government ownership and leasing of special nuclear materials provides another form of indirect financial assistance to private utilities since the government use charges are in most cases less than the inventory carrying charge that would be necessary if the utilities had to finance the purchase of the materials. It is estimated that inventory carrying charges for privately-owned utilities would increase from 4.75% per annum under lease to from 9% to 12% 1/ per annum under purchase. (It should be noted, however, that private utilities may be able to make financing arrangements that would lower this spread.) The inventory carrying charge for publicly-owned utilities, which rely on debt financing and do not pay income taxes, should be somewhat less under purchase than under lease at 4.75% per annum.

The estimated effect of private ownership vs. lease on the cost of power produced in thermal reactors by private utilities is indicated in the table below:

Inventory Carrying Charge Rate per Annum	Estimated BRM Inventory Cost-Mills/kwh (range)
4.75%	0.2 - 0.4
9.00	0.4 - 0.8
12.00	0.5 - 1.0

An estimate of the dollar magnitude of the assistance, by individual projects, in furnishing U-235 under lease arrangements as compared to public and private financing of inventories under private ownership is given in the table which follows. This table shows the estimated annual increase (or decrease) in inventory carrying charges under private ownership over use charges at 4-3/4% under the lease arrangement. It is based on assumptions that carrying charges under private ownership are from 9% to 12% per annum for private utilities, 4.25% for public utilities, and 2.5% for rural cooperatives. This computation represents the estimated annual assistance under the assumed conditions that there were no waivers of use charge and the utilities owned the power demonstration reactors now owned by the AEC.

1/ Based on an estimated cost of money of 6.0% (assuming 50% of requirements obtained through equity financing and 50% through issuances of bonds) and estimates of taxes and insurance ranging from 3.0 to 6.0%

Revised page

Estimated Annual Assistance
Lease as Compared to Private Ownership

	Estimated Assistance per year (in thousands) (range)
1. Private Utilities	
Dresden Nuclear Power Station, Morris, Ill. (Commonwealth Edison Co.)	$ 236.1 to $ 402.7
Consolidated Edison Thorium Reactor, Indian Point, N.Y. (Consolidated Edison Co. of New York, Inc.)	773.3 to 1,319.1
Bodega Bay Atomic Park, Bodega Bay, Cal. (Pacific Gas and Electric Co.)	376.1 to 641.6
Humboldt Bay Power Plant, Unit #3, Humboldt Bay, Cal. (Pacific Gas and Electric Co.)	111.9 to 191.0
Vallecitos Boiling Water Reactor, Pleasanton, Cal. (GE Company and Pacific Gas and Electric Co.)	24.6 to 42.0
Saxton Nuclear Experimental Reactor Project, Saxton, Pa. (Saxton Nuclear Experimental Corp.)	37.1 to 63.2
Vallecitos Experimental Superheat Reactor, Pleasanton, Cal. (General Electric Company)	42.4 to 72.4
Yankee Atomic Electric Company Rowe, Massachusetts	376.4 to 642.2
Enrico Fermi Atomic Power Plant, Lagoona Beach, Mich. (Power Reactor Development Co.)	850.0 to 1,450.0
Big Rock Point Plant, Big Rock Point, Mich. (Consumers Power Company)	144.1 to 245.8
Carolinas-Virginia Tube Reactor, Parr, S. C. (Carolinas-Virginia Nuclear Power Associates, Inc.)	18.8 to 32.0
High Temperature Gas Cooled Reactor, Peach Bottom, Pa. (Philadelphia Electric Company)	97.3 to 166.0
Pathfinder Atomic Power Plant, Giant Falls, S. Dakota (Northern States Power Company)	94.0 to 160.3
Duquesne Light Company Shippingport, Pa.	49.0 to 83.5
Sub-Total	$3,231.1 to $5,511.8
2. Public Utilities	
City of Piqua, Piqua, Ohio	$ (6.5)
Consumers Public Power District, Hallam, Neb.	(62.8)
Puerto Rico Water Resources Auth., Punta Higuera, P.R.	(5.7)
Sub-Total	$(75.0)
3. Rural Cooperatives	
Rural Cooperative Power Assoc., Elk River, Minn.	$(59.0)
Dairyland Power Cooperative, Genoa, Wisconsin	(60.4)
Sub-Total	$(119.4)
Grand Total	$3,036.7 to $5,317.4

NOTE: Parentheses ( ) indicate negative assistance.

10. Leasing of Heavy Water

The published charge of $28.00 per lb. of heavy water recovers full cost to the government. Since government costs do not include all elements of costs incurred by industry and no profit allowances are included, it is possible that commercial production of heavy water would be priced higher than $28.00. However, a recent engineering study of a new heavy water plant of improved design constructed in a low cost fuel area indicates that commercially produced heavy water could probably be priced at less than $28.00 per pound.

The leasing of heavy water is limited to research and development and the first five years of operation of cooperative power demonstration reactor projects. The effect of leasing rather than selling heavy water in these limited cases would be similar to the effect of leasing rather than selling special nuclear materials as indicated above. At present there is only one cooperative heavy water power reactor project authorized (Carolinas-Virginia). The leasing of heavy water at the 4.75% use charge vs. private financing with carrying charges from 9% to 12% provides annual assistance during the first five years of operation ranging from $95.2 to $162.4 thousand.

11. Raw Material Incentive Bonus

The original bonus program (Circular No. 2) issued in April 1948, provided for the payment of $10,000 for delivery to the Commission of the first twenty short tons of uranium-bearing ores assaying 20% or more U_3O_8 from any single mining location. During the ten years this Circular was in effect only one delivery qualified for the bonus payment. On the basis of information available at the time the announcement was made, it was thought that the principal hope for a large production lay in the discovery of high-grade deposits similar to those mined in the Congo and in northern Canada.

The bonus for initial production (Circular No. 6) was initiated March 1, 1951. It provided for the payment of a bonus for the first 10,000 pounds of U_3O_8 produced from any property and covered all types and grades of ore acceptable for purchase at the established buying stations and mills. This program proved particularly effective in assisting the development and opening up of mines by prospectors and small operators and was directly responsible for the

development of many productive mines. Bonus payments under this program applied to about 1,200 mining properties. This program expired March 31, 1960.

Bonus payments under the two circulars totaled $17.8 million.

The costs of the raw material incentive bonus program were included in the government price schedules for enriched uranium in effect prior to July 1, 1961. Since this program was terminated in 1960, no allowance is included in the current schedule of charges.

12. Radioisotopes for Biomedical and Agricultural Research

In the past, AEC provided discounts of 80% of list prices on radioisotopes used for cancer research and for biomedical and agricultural research, except medical therapy. The amounts of the discounts were funded through the Biology and Medicine Program until these discounts were discontinued on June 30, 1961. The cumulative cost of this assistance was $1.6 million.

13. Tax Write-offs and Rapid Amortization

The AEC does not authorize any provision for tax write-offs in its operations. In the past, the now defunct Office of Defense Mobilization certified new industrial plants as necessary to the national defense, and under these certifications tax write-offs over a five-year period were obtained. The law providing for such tax write-offs expired on December 31, 1959. The only nuclear power plant facility certified by ODM was a portion of the Duquesne Light Company's investment at the Shippingport station amounting to $16.7 million. Some companies who constructed private plants under contracts with the AEC qualified under this arrangement.

It is difficult to assess the financial benefits to the uranium milling industry resulting from fast tax write-offs of mill facilities certified by ODM. Principal reasons for this are the lack of financial and income tax data relating to past operations of the companies and uncertainties with regard to the future.

Generally, the reduced taxes in the earlier years are offset by higher taxes in later years.

Some financial benefits result from the use of monies retained in the earlier years until they are needed in later years for tax payments. Such benefits would be negligible in comparison with those derived from the percentage depletion allowance (23% of gross income) permitted under the Internal Revenue Code. The amounts of tax benefits derived from the percentage depletion allowance is not readily determinable because of the lack of information on actual depletion and allowable depreciation, as well as other financial data.

Assistance has resulted from the rapid amortization of uranium mills under unit-price procurement contracts. An attempt has been made to estimate the value of this assistance as explained in the two following paragraphs. It should be noted that a number of arbitrary assumptions were necessary in order to arrive at the estimated total assistance of $34.6 million.

Some 23 domestic mills, all privately-owned, are producing U_3O_8 concentrate for the AEC and most of these will continue such production through 1966. Amortization of $109.8 million was included in the contracts negotiated. With the plants amortized as provided in the contracts and the investment of the amounts thus made available to return 4.5% per annum, compound interest income over the estimated 15-year life of the plants would amount to $81.2 million. Were the investment in all plants recovered over a 15-year period and the amounts thus made available invested at the rate suggested above, the interest income would amount to $46.6 million. The additional interest income under the rapid amortization case would be $34.6 million.

The above data were based on the assumptions (1) that each mill has a useful life of 15 years, (2) that the amount to be amortized under each contract is the net value of the mill after allowance for net salvage value and (3) that an interest rate of 4.5% per annum (an approximation of the average 1958-1962 commercial rate) is the most probable average rate of interest over the 15-year life being postulated. Many variables, such as the availability of feed, the durability and/or obsolescense of each mill and the continued marketability of uranium concentrates cannot be determined with any accuracy. However, a 15-year production life has been assumed in order to develop an estimate.

For the same reason, no account was taken of factors related to investments made by the mills but disallowed and determined to be non-recoverable under the negotiated contracts.

14. Governmental Indemnity

Section 170 of the Atomic Energy Act of 1954, as amended by Public Law 85-256 (the Price-Anderson Act), provides a means of protecting the public from financial loss due to a catastrophic nuclear incident arising out of the operation of certain nuclear facilities. In addition, it provides licensees with relief from financial liability for that portion of any loss which exceeds the maximum protection available from commercial insurance sources ($60 million). Since the total loss from such an incident might greatly exceed the amount of private insurance available, the AEC is authorized to enter into indemnification agreements with some of its licensees and contractors providing public liability protection of $500 million for each nuclear incident.

Except for non-profit educational institutions and federal agencies, the operator of a licensed nuclear facility is required to provide some financial protection in order to qualify for the indemnification. The exact amount of financial protection depends on the type of reactor operated and the power level.

As of March 31, 1962, AEC had entered into 61 indemnity agreements with licensees and 59 with contractors including four power demonstration reactor participants. To provide the indemnity protection, the AEC charges licensees a fee of $30 per thousand kilowatts of thermal energy capacity with a minimum annual fee of $100. Revenue from such fees through March 31, 1962 was $131 thousand.

The fee for private indemnity insurance is based on various criteria such as location, type and use of reactor. A base charge is developed for the first million of protection and further protection is computed in accordance with the following:

million of protection	% of Base Charge
first million	100%
next 4 million	50%
next 5 million	20%
next 10 million	10%
next 20 million	5%
next 20 million	2.5%

As can be seen from the above table, the final $20 million of protection requires a premium of only 2.5% of the base charge; however, the insurance companies have established a minimum of $1,000 per million of protection for power reactors and $500 per million for research reactors. The premium paid during the first ten years is subject to adjustment beginning in the eleventh year based on the payments made by the insurance companies. The adjustment could be as much as seventy per cent of the earned premium.

Accordingly, it is not possible to estimate by extrapolation what the probable commercial indemnity rates might be for coverage in excess of the $60 million because of the small number of power reactors presently in operation, the wide variation in commercial insurance rates for different reactors due to considerations other than size or power level, and the provisional nature of the premiums during the first ten years. Therefore, the monetary value of assistance provided by government indemnity cannot be estimated.

15. Indirect Costs

The costing system of the AEC provides total manufacturing costs and unit cost information on all of the materials and products produced in AEC's regular production plants. Manufacturing costs include direct material, direct labor, power, processing materials, maintenance, supervision and other indirect costs incurred by production contractors, including depreciation, that are applicable to a particular plant or process. In computing government full cost recovery prices for materials or services, an added factor is applied to the manufacturing costs to recover those tangible and intangible costs which are not included in the manufacturing costs. Examples of such costs are process development, startup and standby, community operations, AEC administration and security clearance costs, self-insurance and imputed interest on investment in plant and working capital. These costs are related to the costs of each principal product or processing operation as a percentage of manufacturing costs.

If AEC materials and services were provided to the industry commercially rather than by the government, the charges would normally be higher because of higher commercial interest rates, higher costs of commercial insurance, and allowances for taxes. Thus there is a form of indirect financial assistance involved in the

supplying of materials and services by the government at its full cost. This form of indirect assistance is involved in the government charges for the following materials and services discussed in this report.

1. Charges for irradiated fuel processing
2. Low-level waste disposal
3. Charges for use and consumption of enriched uranium
4. Prices for heavy water
5. Prices for radioisotopes and stable isotopes
6. Prices for special reactor materials
7. Prices for technical publications and miscellaneous services

Assuming that industry costs other than interest, taxes and insurance were the same as government costs, AEC studies indicate that industrial costs of material and services could exceed government costs by from 4% to more than 30%. The larger variations in costs would occur in those cases where the plant investment is very large in relation to annual costs of operation. Assuming that on the average industry costs would exceed government costs by 10%, the cumulative estimated benefits through June 30, 1963 for materials and services sold to domestic organizations would be in the order of $5 million. This makes allowance for taxes (other than income taxes), commercial insurance rather than self-insurance, and commercial interest rates at 5% per annum as compared with lower government interest rates. A breakdown of these estimates of indirect assistance follows:

	Millions of Dollars
Isotopes	$ 2.3
Source and Special Nuclear Materials	1.5
Heavy Water	0.1
Other Materials and Services *	1.1
Total	$ 5.0

* Includes $20 thousand for low-level waste disposal

The magnitude of additional costs relating to carrying charges on U-235 inventories compared to use charges under lease has been covered under item 8, Leasing of Enriched Uranium.

16. REA Loans to Rural Electric Corporation

The Rural Electrification Administration has authorized loans to the Rural Cooperative Power Association, Elk River, Minnesota and the Dairyland Power Cooperative, Genoa, Wisconsin up to a maximum of $9,979,600. Assuming average public power interest rates at 3.75% per annum, assistance provided by REA loans at 2% is estimated to average $87.3 thousand per year for the two cooperatives. This assumes borrowings of the maximum amounts authorized.

ATTACHMENT A

SUMMARY OF ESTIMATED FINANCIAL ASSISTANCE TO THE ATOMIC ENERGY INDUSTRY

through Fiscal Year 1963

AEC Costs	Estimates (in millions)	
R&D Assistance - Privately-owned Cooperative Power Demonstration Projects	$ 41.3 a/	
Construction of AEC-owned Power Demonstration Reactors	122.2 a/	
Guaranteed Fair Prices for Pu and U-233	4.5	to $ 5.7
Raw Material Incentive Bonus	17.8	
Radioisotopes for Bio-Medical and Agricultural Research	1.6	
Sub-total	$187.4	to $188.6
Other Financial Assistance		
Waiver of Use Charges	$ 8.1 a/	
Irradiated Fuel Processing	b/	
Leasing of Pu and U-233	c/	
Leasing of Enriched Uranium	c/	
Leasing of Heavy Water	c/	
Rapid Amortization	d/	
Government Indemnity	b/	
Indirect Costs	5.0	
Sub-total	$ 13.1	
TOTAL	$200.5 e/	to $201.7

a/ Above estimated costs are through fiscal year 1963. The estimated totals for currently authorized projects are $49.9 million for R&D assistance, $127.1 million for construction of AEC-owned Power Demonstration Reactors, and $14.6 million for Waiver of Use Charges.

b/ Indeterminate amount.

c/ Annual assistance, lease as compared with private ownership, is estimated to range from approximately $3 to $5.3 million for enriched uranium that would be required for all nuclear plants in operation, under construction and planned. Estimates of annual assistance for plutonium and U-233 range from $51.3 to $87.6 thousand, and annual estimates for heavy water range from $95.2 to $162.4 thousand.

d/ Interest income accumulated at a rate of 4-1/2% per annum over a 15-year period on the amounts made available by accelerated amortization of uranium mills under unit price procurement contracts would provide an estimated $34.6 million more than interest income on amounts made available by amortization taken evenly over a 15-year period.

e/ Assistance provided rural electric cooperatives by REA loans at 2% would be negligible through fiscal year 1963. After completion of the projects, this assistance is estimated to average approximately $0.1 million per year.

PART B

GENERAL ASSISTANCE BY GOVERNMENT TO THE ATOMIC ENERGY INDUSTRY

OUTLINE

1. Introduction
2. Raw Material Exploration, Process Development and Procurement
3. Production Process Development
4. Reactor Development
5. Physical Research
6. Biology and Medicine
7. Isotope Development
8. Peaceful Nuclear Explosives
9. Nuclear Materials Management
10. Training, Education and Information
11. Atoms for Peace
12. Other Federal Agency Expenditures
13. Industrial Development Effort

PART B

1. Introduction

The general assistance to industry in this Part B results from the programmatic responsibilities of AEC under the Atomic Energy Act of 1954, as amended, particularly those sections relating to research and development. Scientific and technical information and experience resulting from the conduct of these AEC programs has become available to the public, and thus helped in the establishment of the atomic energy industry. Sections on raw material and production activities have been included at the request of the JCAE staff.

Information relating to contributions of other Federal agencies to atomic energy work and also the magnitude of industrial development effort in atomic energy are included.

2. Raw Materials Exploration, Process Development and Procurement

When the exploration program was undertaken AEC had no basis for predicting how much, or where, additional uranium would be found. Much of the exploration by both the AEC and private industry resulted in no discoveries. Many prospectors and private operators never recovered their exploration expenditures. Many important discoveries were made without direct assistance from AEC exploration programs. The principal contribution of the AEC exploration program to the discovery of our major producing areas was the dissemination of information on uranium geology and the development of new exploration techniques.

Approximately 85% of the cost of the drilling done by the AEC, including that done by the USGS under contract, was in the Uravan Mineral Belt, which at the time was the only area in the U. S. known to contain uranium deposits and hence offered the best opportunity for quickly developing new production. This work was performed during the early part of the program and resulted in some indirect assistance in the form of geological drilling on private property. About 50% of the drilling, however, was on public lands withdrawn by the AEC for purposes of exploration. Some of the deposits which were discovered were leased on a royalty basis

to private operators but part of the reserve amounting to nearly one million tons of ore is being held by the AEC for future needs.

The total cost of the exploration program, discontinued in 1962, amounted to $80 million, approximately $25 million of which was spent for drilling on private and Government lands. The remaining $55 million was the cost for aerial and geological reconnaissance, mapping, examination of mines and prospects and gathering data required in the administration of the procurement program.

Among other measures designed to stimulate and encourage the production of uranium ore, the Commission for several years engaged in a program of constructing uranium access roads in those areas of the Colorado Plateau and adjoining areas where the need was most acute. The selection of road projects was made by the AEC and the planning, estimation and supervision of the projects were performed by the Bureau of Public Roads. Total cost of this program was $8.5 million.

The process development program was undertaken to develop economic processes for recovery of uranium from new types of ore and the improvement of existing processes. About the only chemical processes in use at the time were those for recovering by-product uranium from the vanadium-uranium ores of the Colorado Plateau. Consequently, the principal effort was the development of new processes. This work was highly successful and is responsible for the basic processes now used in nearly all of the uranium mills of the world. Additional improvements have been made by private industry which have resulted in a further increase in recoveries and reduction in costs. The process development program undoubtedly has paid for itself many times as a result of lower prices for uranium concentrate paid for by the Commission.

Extensive process development also was undertaken to recover uranium from low-grade shale and phosphate deposits. This work was in the nature of insurance in case adequate sources of conventional ores were not found. However, a process was developed for recovering by-product uranium from wet process phosphate fertilizer plants which are now capable of recovering U_3O_8 at a cost of approximately $8.00 per pound.

This program was terminated on June 30, 1959.

Cumulative costs of raw materials process development through June 30, 1959 were as follows:

	(in millions)
Ore processing	$15.6
Phosphate rock and shales	8.0
Other	3.2
Total	$26.8

In order to stimulate production of uranium-bearing ores of the Colorado Plateau area and thereby obtain adequate supplies of U_3O_8, AEC issued Domestic Uranium Program Circular Nos. 3, 4 and 5 establishing guaranteed minimum prices for the uranium content of such ores through March 31, 1962. Similarly, in 1956 the AEC established a guaranteed price for U_3O_8 mill concentrates for purchases during the period April 1, 1962 through December 31, 1966. This action was taken in recognition of the need for a continuing Government market in order to maintain a high rate of exploration and development. In a June 1961 report of the General Accounting Office on selected aspects of the domestic uranium procurement program, they stated that they were unable to determine and evaluate the basis for the $8.00 price because of the incompleteness of supporting documentation. The $8.00 price per pound of U_3O_8 in concentrates was used by AEC in developing the schedule of charges for enriched and depleted uranium that became effective July 1, 1961.

3. Production Process Development

The Government program for development of manufacturing processes, and the construction and operation of facilities for production of uranium feed materials and special nuclear materials has contributed a vast knowledge of process technology and operating know-how which has become available to the processors of fuel materials for the nuclear power industry. The development, construction and operation of production reactors have also contributed the technological base upon which much of the development of power reactors was undertaken. The development and improvement of gaseous diffusion technology and plant operations for the production of enriched uranium has contributed to the availability of adequate supplies of enriched fuel material at costs significantly lower than would have been possible had it not been for the large weapons requirements for national defense.

The estimated cumulative costs through June 30, 1963 of process development programs indirectly relating to the supply of fuel materials now used in the nuclear power industry are $525.3 million.

4. Reactor Development

Part A of this report discusses the financial assistance provided by AEC in support of specific projects of the Power Demonstration Reactor Program. The AEC also supports an extensive program of R&D, including experimental reactor construction and operation to develop nuclear systems technology for many different applications in the broad fields of civilian power, military, and space. In some cases this effort is directly related to civilian power application; in some cases the results are beneficial, in part, to the civilian power program; and in some cases the work is clearly oriented toward military or space objectives, although the results may, of course, eventually find some application in the civilian power field. In all cases, research and development results of work sponsored by the AEC are made generally available to industry, subject only to classification restrictions.

Included in the category of work directly related to commercial power application is the work done under the cooperative program with Euratom. Under this program, research and development contracts are sponsored in equivalent dollar amounts by AEC and Euratom. The results of this work, together with construction and operating information on Euratom power projects, become available to industry. Areas of research and development which, in particular, include work of value to commercial power and other applications are general nuclear technology and nuclear safety.

General nuclear technology provides technical support applicable to a wide range of problems which are common to many reactor projects. Examples are the development of improved materials and components, special reactor materials, control techniques, chemical separation and fuel recovery systems, and waste disposal procedures. Special reactor materials such as heavy water, zirconium, reactor grade graphite, beryllium, boron-10 and 11, and hafnium, were developed for use in reactors because of their nuclear and other special properties and because they were not commercially available in the quantities or required chemical purities needed for atomic energy use.

Similarly, the nuclear safety program investigates technical problems related to many classes of reactors.

All of the research and development conducted or supported by the Commission, under very broad terms, can be considered potentially useful to the nuclear power industry. However, estimates of the degree to which R&D relates to civilian applications varies considerably, depending on the guidelines used or the individuals making these judgments. Recognizing the inherent inaccuracies in making such estimates but desiring, nevertheless, to arrive at a rough approximation of the costs for general nuclear technology and nuclear safety related to civilian applications, percentages were obtained by separating from the total expenditures the following areas: (1) R&D directly identified with military reactor projects and aerospace projects, and (2) R&D related to Commission production activities.

On this basis approximately 50% to 70% of the costs of general nuclear technology and nuclear safety R&D are treated in this report as related to commercial power applications.

The AEC support of R&D in national laboratories, universities, etc. provides benefits in varying degrees to industry in general. These benefits include: industrial access to resulting R&D information; a source of experienced scientists, engineers and technicians; a training ground for industrial employees (by loan assignment to national laboratories); and possible use of special equipment and facilities services.

The AEC support of R&D in industrial concerns provides the same industrial benefits listed above as well as the following: developing experienced individuals and groups; maintaining a company workload; incentive to maintain, improve and increase company facilities, equipment and materials; and opportunities for embarking on related marketing ventures.

The estimated cumulative costs of the reactor development program through fiscal year 1963 are shown in the following table. Estimates of the amounts relating to commercial applications and to military, space, maritime and other non-commercial applications are also shown based on the discussion on pages 27 and 28.

ESTIMATED CUMULATIVE OPERATING COSTS
OF REACTOR DEVELOPMENT PROGRAM

through June 30, 1963

	Total	Commercial Applications	Military, Space, Maritime & Other Non-Commercial Applications
		(in millions)	
Civilian Power	$ 585.5	$ 585.5	
Power Demonstration a/	94.0	94.0	
Euratom	8.3	8.3	
General Nuclear Technology	379.4	189.7 to $265.6	$ 113.8 to $189.7
Nuclear Safety	101.1	50.5 to 70.8	30.3 to 50.6
Military, Space & Maritime	1,613.2		1,613.2
All Other	819.2		819.2
Total	$3,600.7	$928.0 to $1,024.2	$2,576.5 to $2,672.7

a/ Excludes amounts shown in Part A.

As part of its reactor development program, the AEC constructs and operates experimental power producing reactors. Experience and information resulting from this effort provides industry with useful information on the feasibility, characteristics, reliability and potential of each reactor type. The total estimated plant costs of these projects, some of which are still under construction, are as follows:

Reactor	Estimated Costs (in millions)
Experimental Boiling Water Reactor	$ 7.0
Sodium Reactor Experiment	11.0
Experimental Breeder Reactor - II	33.8
Experimental Gas Cooled Reactor	41.2
Total	$93.0

The estimated net investment in AEC plant and equipment at June 30, 1963 applicable to reactor development and all other R&D programs is shown in the following table. There is no reasonable basis for allocation of this investment to the various programs (such as reactor development, physical research, biology and medicine) that utilize the facilities. The estimated costs of AEC-owned reactors shown separately above, and in Part A, item 4 - Construction of AEC-Owned Power Demonstration Reactors - through June 30, 1963, are excluded from this table.

Estimated Net Investment in Research and Development Plant at June 30, 1963

	(in millions)
Laboratories	$ 804.6
Reactors	431.5
Accelerators	255.7
Other research facilities	25.0
Total	$1,516.8

5. Physical Research

The conduct of the physical research program throughout the years has created a fund of basic information beneficial to the atomic energy industry. Although this program was conducted principally for the purpose of obtaining knowledge needed for the AEC program for production of special nuclear materials and weapons, benefits to industry have resulted in such areas as nuclear structure and neutron physics, mathematics and computer research, chemistry research, and metallurgy and materials research.

Stable isotopes are used in the physical research program of the AEC in such fields as cross-section measurements that contribute to the basic knowledge available to industry for use in the selection of materials and components for reactors and reactor fuels. The development and construction of the special facilities for production of stable isotopes, carried out under the Government program, has resulted in a production capability for these rare materials which does not exist in industry.

The estimated cumulative operating costs of the physical research program through June 30, 1963 are $1,382.6 million. The estimated net investment in plant and equipment at June 30, 1963 applicable to all AEC research and development programs is shown in the table on page 30.

6. Biology and Medicine

This program has provided the basic information needed by the atomic energy industry for the establishment of health and safety standards. Although a very large part of the research performed under this program relates directly to effects of weapons fallout on all living matter and beneficial effects in the areas of medicine, bio-physics and agriculture, much of the work in such areas as radiological and health physics, radiation instrumentation, and chemical toxicity are of some benefit to industry.

The estimated cumulative operating costs of the biology and medicine program through June 30, 1963, exclusive of the radioisotope discounts discussed in Part A, item 12, are $609.3 million. The estimated net investment in plant and equipment at June 30, 1963 applicable to all AEC research and development programs is shown in the table on page 30.

7. Isotope Development

The isotope development program, like the reactor development program, has provided general research, development and technology relating to the production of radioisotopes and their practical utilization in the fields of physical research, biology and medicine and in many industrial-type applications.

Radioisotopes produced by the AEC for commercial uses and private research and development are priced on the basis of full Government costs. The one exception to this was the program of providing discounts for certain research uses, as discussed under Part A, item 12.

Estimated cumulative operating costs of the isotope development program through June 30, 1963 are $24.1 million. Estimated net investment in related plant and equipment is included in the table on page 30.

8. Peaceful Nuclear Explosives

This recently initiated development program has a potential for commercial application in a number of different fields, such as extraction of oil from shale, opening inland waterways and creation of harbors. At the present stage of development, however, it is not possible to foresee the impact on industry that might come about.

Estimated cumulative operating costs of this program through June 30, 1963 are $33.8 million.

9. Nuclear Materials Management

This activity was initiated in the early days of atomic energy for the purpose of controlling source and special nuclear materials of strategic importance to the U. S. It has been an essential part of process control in AEC plants. It has contributed practically all of the technology relating to measurement and sampling techniques, analytical procedures and isotopic analyses of source and special nuclear materials used by the atomic energy industry. This technological information, which was developed over a long period of years, contributes useful knowledge to the atomic energy industry.

The cost of this activity is included in program costs and AEC administration, and cannot be separately identified. However, an appropriate share of such cost is recouped in full cost recovery prices for materials and services.

10. Training, Education and Information

As a part of its nuclear education and training activities, the AEC provides grants to educational institutions for the purchase of equipment. In addition, use and consumption charges are waived on source and special nuclear materials and heavy water on loan to educational institutions for research reactors and subcritical training reactors and no charges are made for security clearances.

The tuition fees for most of the schools and courses operated by the AEC are based on charges established for like courses given by colleges and universities and do not recover full costs in all cases. Training institutes are operated on various offsite locations at no cost to the participants and fellowships are awarded to deserving individuals. The cumulative costs, net of revenues, for the training and education program through June 30, 1961 and the total estimated through FY 1963 are as follows:

	Cumulative FY 1961	Estimated Total thru FY 1963
	(in thousands)	
Grants for purchase of equipment	$22,207	$25,907
Operation of schools & courses (net)	9,330	15,061
Training institutes	4,171	6,939
Fellowships	7,692	10,897
Other costs	3,240	5,812
Waiver of use charges	936	1,892
Security clearances	46	46
Total	$47,622	$66,554

The AEC Division of Technical Information is responsible for the publication of classified and unclassified technical documents which are available to industry and the public.

The access permit program was developed so as to provide security clearances for representatives of industry to permit them to obtain classified technical information documents and other classified information available at Government installations which were needed in the development of a private atomic energy industry.

From the beginning of the access permit program in 1955 to January 1, 1959, no charge was made for the first twenty-five clearances requested by an access permit holder. As of January 1, 1959, no additional free clearances were granted except for non-profit educational institutions as discussed above.

11. Atoms for Peace

The AEC administers grants provided out of the Agency for International Development's (formerly MSA) funds to foreign countries (1) to assist in the construction of research reactors, (2) for laboratory equipment for research and medical purposes, and (3) for conferences, symposiums and technical assistance. The costs of this program through June 30, 1961 and estimates for future years based on current authorizations are as follows:

	Cumulative FY 1961	Estimated Total
	(in millions)	
Research reactors	$3.50	$ 9.30
Laboratory equipment	1.33	2.88
Conferences, etc.	0.32	0.55
Total	$5.15	$12.73

12. Other Federal Agency Expenditures

Since fiscal year 1951 the AEC has performed non-weapons atomic energy work for other Federal agencies for which funds are provided or reimbursed by other agencies. Although details by agency are not available, this work is principally in connection with fuel for DOD nuclear reactors. The estimated cumulative expenditures through June 30, 1963 total $375.6 million.

13. Industrial Development Effort

The Edison Electric Institute reported to the Joint Committee on Atomic Energy during the 1962 Joint Committee Hearings on the Development, Growth and State of the Atomic Energy Industry that 124 companies are participating in one or more of 23 nuclear projects. These projects include five plants in operation, nine plants under construction or design, two projects in preliminary planning or contract negotiations, and seven utility groups engaged in nuclear research, development and study projects. The 16 nuclear construction projects will involve estimated utility company expenditures of about $700 million. (Seven of these 16 projects are AEC cooperative projects shown in Part A of this report.)

These 16 projects are:

In Operation	Under Construction or Design		In Planning or Contract Negotiation
Dresden	Indian Point	Parr *	Southern Cal. Edison & San Diego G&E
Yankee *	Pathfinder *	Saxton	
Shippingport *	Humboldt Bay	Bodega Bay	New England Electric System
Vallecitos	Big Rock Point *	Peach Bottom *	
Santa Susana		Fermi *	

* Indicates AEC cooperative projects

Estimates of utility company expenditures for the above projects (except for the New England Electric System Plant) including research and development work but exclusive of operation costs, and other expenditures for nuclear power studies, research and development through June 30, 1963 are:

	Cumulative thru FY 1963 (in millions)
Expenditures for projects	$483.8
Other expenditures	36.6
Total	$520.4

In addition to the private industrial development effort, five public power associations have estimated total expenditures for conventional portions of nuclear plants of $37.9 million, as shown in Part A of this report.

ATTACHMENT B

SUMMARY OF THE ESTIMATED COSTS OF GOVERNMENT R&D TYPE ACTIVITIES

through Fiscal Year 1963 a/

	Estimates (in millions)
1. AEC Operating Cost	
Raw Material Exploration and Process Development	$ 115.3
Production Process Development	525.3
Reactor Development	3,600.7 b/
Physical Research	1,382.6
Biology and Medicine	609.3
Isotopes Development	24.1
Peaceful Nuclear Explosives	33.8
Training, Education and Information	66.6
Sub-Total	$ 6,357.7
2. AEC Net Investment in Plant and Equipment for Research and Development	
AEC Experimental Power Producing Reactors	$ 93.0
Other Research and Development	1,516.8
Sub-Total	$ 1,609.8
3. Other Federal Agency Expenditures	
Atoms for Peace	$ 12.7
Other (Principally for DOD nuclear reactor fuels)	375.6
Sub-Total	$ 388.3
TOTAL	$ 8,355.8

a/ The above program is for national defense and security, and for peaceful applications, with only a portion of the above costs resulting in benefits to the atomic energy industry. Except for the reactor development program, no monetary value has been estimated for the general assistance to the atomic energy industry.

b/ Roughly $900 million to $1.0 billion of this amount is estimated to be related to commercial applications. See table on page 29.

NOTE: The estimated amount of industrial development effort through June 30, 1963, as discussed on pages 34 and 35, is $558.3 million.