Mg-1565

Vol I

ISOTOPES PROGRAM 3

DISTRIBUTION AND TRANSFER

Correspondence from 8-25-58 to 6-15-62

For previous material on AEC 994 Series see: Res. & Dev. 13.

	Date	To	From	Class	Pgs.	No.	Distribution & Transfer To	From	Class
1	1-28-61	AEC 398/20 Radioisotopes Research Support Program Termination of Radioisotopes Research Support Program	skw	ouo					
2	3-10-61	AEC 994/7 Cobalt-60	vee						
3	4-18-61	AEC 994/8	skw	ouo					
4	9-13-61	AEC 994/9	skw						
5	3-23-62	AEC 994/10 Progress Rpt. on Isotope Devel. Isotopes Devel. Progress Rpt.	vee						
6	6-15-62	AEC 398/21 TVA Request for N 15	vee						

TITLE

Isotopes Program 3 Distribution & Transfer

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1	8-25-58	AEC 994/3 Isotopes Devel. Program	vee	u					
2	9-29-58	Industrial Uses of Isotopes	skw	u					
3	3-24-59	AEC 994/4 Auchincloss, Samuel S.	vee	u					
4	4-6-59	McCone, John National Industrial Conference Board	vee	u					
5	5-29-59	Price for Isotopes Carbon 14	skw	u					
6	9-18-59	AEC 994/5 Isotopes Development Contracts with Industry Contracts with Industry re Isotope Development	skw	u					
7	10-9-59	Isotopes Report	vee	u					
8	10-12-59	International Directory of Radioisotopes	vee	u					
9	12-12-60	AEC 994/6	vee	u					

Isotopes 3

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June 15, 1962

AEC 398/21

COPY NO. 41

AEC 398/21

ATOMIC ENERGY COMMISSION

TVA REQUEST FOR N^{15} FOR RESEARCH PURPOSES

Note by the Secretary

The Office of the Chairman has requested that the attached letter from Herbert D. Vogel, Chairman, TVA, be circulated for the information of the Commission. The letter has been referred to the General Manager for appropriate action.

W. B. McCool

Secretary

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TENNESSEE VALLEY AUTHORITY
KNOXVILLE, TENNESSEE

OFFICE OF THE BOARD OF DIRECTORS

June 6, 1962

Dr. Glenn T. Seaborg, Chairman
Atomic Energy Commission
Washington 25, D. C.

Dear Dr. Seaborg:

I am writing you about a matter in which AEC can be of very great assistance to TVA in an important public program. It involves use by TVA of a portion of AEC's supply of the isotope N^{15}.

N^{15} is a research tool of great promise in a problem with which TVA has been concerned for some years. Unfortunately N^{15} is not available to us to use. If it can be made available, TVA is prepared to undertake a very comprehensive research program embracing nitrogen transformations in soils and the subsequent development of new nitrogen fertilizers. The main objectives are to (1) gain basic information relating to the fundamental factors involved in nitrogen losses from agricultural soils and (2) develop and evaluate new nitrogen fertilizers designed to minimize nitrogen losses from soils and increase the utilization of applied nitrogen by crop plants.

Nitrogen losses from soils are a costly drain on the pocketbooks of farmers all over the world. In 1960, farmers in the United States bought 2.67 million tons of elemental nitrogen at a cost of around $200 per ton. For each 100 pounds of nitrogen that the farmer applies, 25 to 50 pounds is lost, primarily by volatilization into the atmosphere or in drainage waters. In 1960 these nitrogen losses cost U. S. farmers at least $150 million. Similar losses are sustained by farmers everywhere who apply nitrogen to their cropland.

TVA's proposed program would use N^{15} as a tracer for laboratory, greenhouse, and limited field investigations. We estimate the program would extend over approximately a 10-year period. However, a reliable commercial source of N^{15} at a reasonable cost does not exist at the present time, and there is considerable doubt in our minds also as to the possibility of a wholly reliable and satisfactory commercial source of N^{15} being developed at any time in the foreseeable future. In fact, our people are having difficulties now in securing even a few grams for initial laboratory research.

We understand the Atomic Energy Commission's current supply of N^{15} consists of approximately 550 grams and that there are no existing plans for utilizing it. TVA personnel have held discussions with AEC personnel at Oak Ridge and in Germantown for the purpose of

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exploring means by which AEC might release N^{15} to TVA for research purposes. These discussions have been hampered by uncertainties as to whether such releases can be authorized. It would be most helpful for these uncertainties to be resolved.

We have in mind that N^{15} would be made available to TVA for a defined cooperative research program under a memorandum of understanding between AEC and TVA. The research would be conducted by TVA with appropriate assistance from institutions, such as land-grant colleges, which regularly participate in TVA's cooperative research program. AEC would supply N^{15} to TVA at times and in amounts sufficient for specific research projects, plans for which AEC had previously reviewed and approved. TVA would distribute N^{15} to cooperating research institutions. We presently estimate the total N^{15} requirement for this program to be approximately 300 grams over a 10-year period.

I am hopeful that you will agree as to the desirability that a means be found whereby AEC and TVA can cooperate in this important work.

Very truly yours,

Herbert D. Vogel
Chairman

AEC

Isotopes

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. E-139
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Thursday, April 26, 1962)

AEC WILL PARTICIPATE IN OHIO CONFERENCE ON INDUSTRIAL RADIOISOTOPES

The Atomic Energy Commission, in cooperation with six industrial, academic, professional, and state organizations, will co-sponsor a one-day conference in Ohio on industrial uses of radioisotopes. The meeting will be held at the Neil House Hotel, Columbus, on May 18.

Joining with AEC in sponsoring the meeting are the Industrial Development Committee of the Ohio Chamber of Commerce, the Ohio Academy of Science, Battelle Memorial Institute, Industrial Nucleonics Corporation, Ohio State Department of Industrial and Economic Development, and the Chamber of Commerce Executives of Ohio.

During the conference, government and industry speakers will discuss the managerial, economic and technical aspects of industrial use of radioisotopes in tracing, gauging, radiography and process radiation. Radioisotope tracing uses the continuous radiation from radioisotopes to follow materials through industrial processes. Gauging makes use of the transmission or reflection of radioisotope radiation to measure the thickness, density, or levels of materials. Radiography is similar to X-ray inspection but uses isotopic sources of penetrating gamma radiation. In process radiation radioisotopic sources are used to supply the energy for beneficial chemical or physical changes in materials.

The one day meeting is designed to provide up-to-date information on the many diverse applications of radioisotopes in industry. Particular emphasis will be placed on improvements in research, production and control, and on the

(more)

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health and safety aspects of radioisotope use. A series of brief experience reports by local industrial users will be included.

Management representatives, scientists, engineers and educators working or interested in these technical areas are encouraged to attend. Detailed information on the conference may be obtained from William T. Blair, director, Industrial Development Department, Ohio Chamber of Commerce, Huntington Bank Building, Columbus 15, Ohio.

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March 23, 1962

AEC 994/10

COPY NO. 65

ATOMIC ENERGY COMMISSION

ISOTOPES DEVELOPMENT PROGRAM PROGRESS REPORT

Note by the Secretary

The Director, Division of Isotopes Development, has requested that the attached Progress Report be circulated for the information of the Commission.

W. B. McCool
Secretary

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THE ISOTOPES DEVELOPMENT PROGRAM

A PROGRESS REPORT

1959 - 1961

The Commission's Isotopes Development Program, implemented in FY 1959, is designed to extend and accelerate the development of new technology for widespread use of radioisotopes and radiation in the national benefit. It recognizes that an undesirable time lag exists between the discovery through basic research of many radioisotope and radiation principles and their practical beneficial application into science, industry and areas of public benefit. This research and development program is serving to bridge the gap.

Particular emphasis is being given to developing large-scale economic uses of fission product wastes created by nuclear reactor operation. Such utilization of these fission products is important to the total nuclear energy development program in the United States because this represents the largest, and potentially the most economical, source of radioactive energy to satisfy future demands for radiation sources and heat-power sources. Utilization of the waste may become important in waste disposal eventually and will, in any case, provide some income to offset the extra costs of ultimate waste disposal.

A principal effort in research and development is also directed toward developing means whereby radioisotopes, and especially the radiation emanating from multi-kilocurie radioisotope sources, can help solve long standing national problems in food distribution, control of environmental pollution, and water resources development and furnish information needed by meteorologists and seismologists. Major subdivisions of this program include radiation pasteurization of foods, radiation processing development, radioisotope technology development, radioisotope process control and production development, and radioisotope training and education.

Extensive studies of major segments of the national economy carried out under the Isotopes Development Program have uncovered hundreds of undeveloped applications important to the national interest.

GENERAL

Establishment of Isotopes and Radiation Development Centers

A. An Isotopes Development Center was established in late 1961 at the Oak Ridge National Laboratory to serve as a focal point for basic and advanced research in radioisotope technology. The Center embraces the major radioisotope facilities at ORNL including the Fission Product Development Laboratory and the new Radioisotopes Development Laboratory. Research scientist participation, both domestic and foreign, will be encouraged to broaden the scientific capability in this area of nuclear technology.

B. A Radiation Development Center was established in late 1961 at Brookhaven National Laboratory to coordinate and advance programs for process radiation development. The High Intensity Radiation Development Laboratory to be completed in mid-1962 will form the nucleus of the Center. The Center, which will serve as a focal point for research and development in this scientific area, will also be available to visiting scientists for research in broad areas of radiation engineering.

Licensee Growth

The number of radioisotope users throughout science and technology continued to increase as noted in the table below:

RADIOISOTOPE LICENSEES

Type		Calendar Year			
		1958	1959	1960	1961
Industrial		1482	1623	1817	1997
	% Increase	18.2	9.5	12.0	9.9
Medical		1982	2286	2568	2807
	% Increase	20.3	15.3	12.3	9.3
Others		1045	1596	1555	1791
	% Increase	76.2	52.7	- 2.6	15.2
TOTAL		4509	5505	5940	6595
	% Increase	29.0	22.1	7.9	11.0

Radioisotope Sales

A. Radioisotope shipments from the Oak Ridge National Laboratory in 1961 set a new all-time high record since the isotopes distribution program was established in 1946. Shipments of over 445,000 curies during 1961 included a record amount of over 40,000 curies of Carbon 14. The following table summarizes comparative shipment data for the years 1958-61:

Year	Curies shipped
1958	228,714
1959	299,366
1960	205,675
1961	445,658

B. Continuing efforts through research and development to make radioisotope production more efficient and economic have made possible lower prices for a wide variety of radioisotopes, importantly including Cobalt 60, Carbon 14, Cesium 137, and Strontium 90.

RADIOISOTOPE AND FISSION PRODUCT PRODUCTION

Radioisotope production and distribution for public use began in 1946. The initial goals of this effort were to develop production processes and make available a wide variety of isotopic species and materials. Since 1959, research efforts have been markedly intensified and directed both towards large scale separation and purification of fission products, source technology and safety development, as well as production of new and lower cost radioisotopes. The greatly increased emphasis on fission products results from the widespread use of multi-kilocurie radiation sources in such new areas of technology as isotopic power and the potential use of radiation as a source of process energy.

Radioisotope Production

New and lower cost radioisotopes have resulted from continued improvement in processing procedures, better production methods, and from the use of enriched stable isotopes as targets. The following are just a few examples of recent developments in radioisotope production technology:

1. The introduction of 26 short-lived processed radioisotopes, ranging in half-life from 12.44 hours (Potassium 42) to 19.5 days (Rubidium 86).

2. Processes for Iodine 131 recovery have progressed from the use of tellurium metal as a reactor target through the use of normal irradiated uranium to the use of enriched uranium in high flux reactors. A record of continuous price reductions due to improvements in processes and equipment characterizes the history of Iodine 131 production.

3. Two new isotopes, Calcium 47 and Iodine 125 were made available for the first time during 1961 for routine distribution. Calcium 47 is a highly useful radioisotope in medical diagnosis. Used as a tracer, it has made possible the localization of metastatic cancer of the bone several months before it could be recognized by conventional methods such as x-rays. Iodine 125 shows great promise for thyroid gland studies, blood plasma volume determination and brain tumor localization. Its low energy photon (.035) is also advantageous in certain cancer investigations and may find application as an industrial radiography source.

Fission Product Separations

The technology for separating and purifying massive quantities of fission products has been advanced during the past several years to the extent that megacurie quantities of purified fission products will soon be readily available. Some major achievements include:

1. The successful demonstration of a new solvent extraction process, developed at ORNL, for the isolation and purification of Strontium 90, Cerium 144 and other rare earths. The first test run at Hanford of the process for final purification of Strontium 90 resulted in the production of 200,000 curies of pure Strontium 90. In total during 1961, 800,000 curies of Strontium 90 were purified. The product was isolated by a precipitation process in the Hanford Purex plant from fission product wastes that had been aged about one year to permit decay of the Strontium 89.

2. Development of a simplified method for the removal of aged Cesium 137 from the waste tanks at Hanford. Unlike other long-lived fission products which eventually form a cake in the waste tanks, Cesium 137 remains in the supernate. The technique developed is to elute off the supernate, run it through a centrifuge to remove the particulate matter and absorb it on "Decalso," an inorganic alumino silicate ion exchange bed. The Cesium 137 can, therefore, be shipped essentially as a solid material. Recently, the largest single shipment of fission products, over 200,000 curies of Cesium 137, was made using this technique. The relative simplicity of Cesium 137 separation and preparation for shipment indicates that massive quantities of the material can be made available at a very low cost.

3. An extraction process for Cerium 144 purification has been developed and successfully demonstrated. The process efficiency is greater than 97% and the purity of the Cerium 144 exceeds 99%. A procedure for pelletizing and sintering cerium oxide pellets was developed using the radioactive material after it was found that partial sintering of the particles by self-heating in the powder prevented the production of a cohesive "green" pellet.

4. Ion exchange technology for the processing of trivalent rare earth fraction has been developed and successfully demonstrated as a means for obtaining highly purified Promethium 147. Additionally, an extremely pure cut of the stable fission product neodymium oxide was recently produced by ion exchange separation.

Source Technology Development

Advances in source fabrication technology have kept pace with improved radioisotope and fission product production. The increasing availability of massive quantities of radioactive materials, for such applications as isotopic power and radiation processing, has led to increased emphasis on the development of methods for the routine fabrication of kilocurie sources. At the same time, however, significant improvements have been made in the fabrication and encapsulation of small radiation sources. For example, techniques first used, such as soldering or brazing of sources, have been replaced by more advanced methods, such as welding and double encapsulation.

New methods for the detection of leaks from sealed sources have also been devised. Another development in improving source safety and efficiency involves the absorption of a cation, such as Strontium 90, Cesium 137 or Promethium 147, on finely ground "Decalso" which is then deposited on various types of backing and fired at 1000°C. The resulting glazed film is resistant to scaling and leaching in many solutions.

Facilities

1. The Fission Product Development Laboratory (originally called the Fission Product Pilot Plant) was placed in operation during 1958. This unique laboratory is presently capable of processing and fabricating sources of megacurie quantities of separated fission products. As processes become routine, these will be taken over by other production facilities and more effort devoted to developing new techniques and new types of sources.

2. The Isotopes Development Laboratory, scheduled for operation at Oak Ridge National Laboratory in 1962, provides for the first time integrated research facilities for advancing radioisotope production processes and source and safety development.

ISOTOPIC POWER FUELS

Great strides have been made during the past several years in the development of both isotopic power hardware and optimum fuel forms. The predictable, long-lived thermal energy produced by radioactive decay under any environmental conditions and the inherent reliability of static direct energy conversion systems make isotopic power uniquely suited for a host of terrestrial, oceanographic and aerospace applications. The long half-lives, vast potential supply and relatively low cost have made fission products particularly desirable for terrestrial and oceanographic use. On the other hand, the high specific power and easily shielded radiations of alpha-emitting isotopes make them uniquely suited for special aerospace applications, where power output per unit weight is the most important criterion.

Fission Products

The first fission product to come under investigation as an isotopic power fuel was Strontium 90. Extensive research culminated in the development of a ceramic material, strontium titanate. Its high strontium content and compound density gives strontium titanate a specific power of 6.3 thermal watts/cc. Additionally, the material (1) is compatible with encapsulating materials, (2) remains stable even beyond its melting point of 3700°F, (3) is practically insoluble in fresh water, (4) has a solubility in sea water measured in parts per billion, and (5) is biologically inert. Over 100,000 curies of Strontium 90 has already been processed into titanate fuels for generators powering weather stations in both the Arctic and Antarctic, as well as a Coast Guard light buoy. An additional 600,000 curies of Strontium 90 is preserved for use in a power barge mounted weather station, under-water electronic equipment and a large ocean buoy.

Cesium 137 is also being seriously investigated as an isotopic power fuel. Its beta energy contribution is considerably lower than Strontium 90. Trapping its gamma energy through an appropriate shielding arrangement, however, gives Cesium 137 a potential specific power high enough to be considered useful as a fuel for isotopic power generators. Results to date indicate that a cesium polyglass compound

(cesium, calcium, aluminum borosilicate) not only provides good power density and stability but has an attractively low dissolution rate in both fresh and sea water. Approximately 29,000 curies of Cesium 137 polyglass is now being fabricated to fuel a five electrical watt underseas power generator. Capable of operation at depths of up to 6000 fathoms, the generator will power a seismograph station being placed on the floor of the ocean.

Other potential applications suggest requirements for many megacuries of Strontium 90 and Cesium 137 during the next several years.

In order to meet some of these projected requirements and to ensure the ready availability of materials for developmental purposes, a "fission product bank" is being created. A minimum of two megacuries of Strontium 90 and one megacurie of Cesium 137 will be converted to suitable forms annually and placed in storage, to be drawn upon as needed.

Alpha Emitters

Firm aerospace requirements have been established for two alpha-emitting fuels. Plutonium 238, the isotope now powering an experimental Transit device, will be used for the operational Transit network, the Navy's maritime navigation satellites. Curium 242 will fuel the generators powering Surveyor program devices. The Surveyor effort entails the soft landing of instrument packages on the moon's surface and represents an important preliminary step in the Nation's manned lunar landing mission.

Although only a few grams of Curium 242 have been produced in the laboratory, the Surveyor program alone will require the production of at least sixty grams of the material annually. Therefore, most achievements to date have been in the development of a production capability, including:

1. Equipping and operating a facility designed to purify Americium 241, reconvert it to the oxide, blend it with aluminum powder and insert it into aluminum capsules suitable for MTR and/or ETR irradiation.

2. Performing a complete process flowsheet for the separation and purification of Curium 242 from irradiated Americium 241, Plutonium 239 and fission products.

3. Design and fabrication of all equipment required for conducting full scale hot cell operations.

Alpha-emitting isotopes can also provide the very high operating temperatures of advanced thermionic conversion systems being developed for aerospace use. A continuing research effort is proceeding to develop

suitable fuel forms of the alpha emitters for these very high operating temperatures. Oxides, carbides and silicides of Curium 242 and Plutonium 238 are now under intensive investigation.

RADIOISOTOPE TECHNOLOGY DEVELOPMENT

The goal of the radioisotope technology development program is to create a broad technical base for development of new and improved radioisotope techniques capable of extension into areas benefiting the national economy and the public interest.

Early in the program, basic industries important to national economic development were surveyed intensively to determine the potentials for radioisotope applications. Specific attention was given to the following industries in which uses were much underdeveloped: pharmaceutical, textile, soap and detergent, coal, natural gas, and food additives. Parallel studies were devoted to an examination of areas of public interest in which radioisotope techniques gave promise of providing solution to long-standing problems, such as water resource management and air pollution.

Twelve of the more noteworthy projects are summarized here. More than 75 such projects have been completed in this phase of the Isotopes Development Program.

Deep Water Isotopic Current Analyzer

This radioisotope technique, utilizing an Iodine 131 source, has successfully demonstrated its value in accurately determining rate and direction of water currents in bays and estuaries. It is the forerunner of an isotopic device which is expected to have a significant impact on the control of water pollution and silt movement.

Water Resources Development

Tritiated water has been used to determine underground storage capacity of ground water. Tests at Lake McMillan, utilizing 180 curies of tritium, provided accurate knowledge of the quantity of stored water when all other conventional methods failed. The technique is expected to be of great value in the effective management of water resources.

Tritium Labeling

An important new method for tritium tagging of high molecular weight hydrocarbons has been developed. This method utilizes the acid catalyst,

a mixture of tritiated phosphoric acid and boron trifluoride ($TH_2PO_4BF_3$), to promote isotopic exchange, and is superior to the Wilzbach technique for many types of labeling. This new technique (a) gives a more specifically labeled organic molecule, (b) avoids generation of highly tagged side products, (c) provides a more stable tag on the molecule, (d) yields a higher specific activity compound, and (e) is easier to prepare. Acid catalyst tagging is a major advancement that is applicable to a multitude of tracer applications.

Air Pollution

A. A new type analyzer has been developed using Krypton 85 in an exchange type reaction to measure instantaneously and continuously the concentration of sulfur dioxide down to 0.1 ppm in the atmosphere. This development, being field tested under a joint project with the California Air Pollution Division, provides quick collection of data for implementation of control procedures in smog management.

B. Neutron activation is being used to study cleaning efficiency and rate of cleaning of pyrites from fine size bituminous coals. If successfully developed, these techniques will assist in controlling a serious air pollution problem in the eastern part of the nation where bituminous coal is high in sulfur content.

Turbine Calibration

A radioisotope method has been developed which will help conserve water by calibrating flow through turbines at hydroelectric power plants. This method, using a few millicuries of Gold 198, successfully demonstrated during recent tests in Tennessee and Kentucky that it was easier to perform and more accurate than the conventional method. Accuracy is known to be within at least 5 per cent, and subsequent tests may show the accuracy to be as good as 1-2 per cent. Comparative cost is $25,000 for performing the conventional rating versus $500 for the radioisotope technique.

Atmospheric Measurement

A. A proof-of-principle model of an isotopic exchange analyzer to measure the ozone content of the upper atmosphere has been tested successfully by the Air Force. A metered amount of air acts directly on the clathratecell and the ozone releases a proportionate amount of Krypton 85 which is measured by a radiation counter.

Tests conducted in a high altitude weather balloon demonstrate that the technique can be used to measure ozone from the earth's surface up to 100,000 foot altitude. The Department of Navy has accepted this technical development and is proceeding with the design of a ruggedized model for routine use.

B. A prototype instrument, based on the beta particle forward scatter principle, has been developed to measure the density of the atmosphere to altitudes of 170,000 feet where no other density sensing instruments will yield reliable data. Carbon 14, Sulfur 35 and Krypton 85 isotopes have been used. Tests to date indicate an accuracy of better than 1% and a cost of less than $100 for the instrument in production. This unit is undergoing further refinement and testing by the U. S. Weather Bureau and is expected to be widely utilized.

Activation Analysis

A. Work being supported on the development of an automatic system of activation analysis has led to world-wide interest. An automated system for activation and gamma ray spectrographic analysis of 1,000 sample lots has been built and is currently under testing. Results are fed into a computer which compares the unknown gamma spectra with standards for positive identification of the various isotopes. This system will be particularly useful for studies of trace constituents in massive sampling programs, such as in analyses of oil well drill-cuttings, ground water, ocean water, human or biological tissues, food additives and crime objects.

B. The technical feasibility of an activation principle in detecting hidden explosives (seeded with boron), as in airplane luggage, by neutron beam examination has been demonstrated. Federal Aviation Agency is evaluating a proposal to build a test experimental model for trial on an airport baggage line.

Mass Flow Measurement

A mass flow measurement technique has been developed which could have wide application in the food processing industry. The technique, based on radioisotopic measurement of density, as in a pair of Pm 147 sources and a scintillation detector, measures fluid flow without contact with the flow stream. This will simplify many important sanitation problems such as those associated with metering milk flow.

Determination of Dissolved Oxygen

A technique for determining the dissolved oxygen concentration in both pure and natural waters has been developed. The radioisotope technique is based on the quantitative oxidation of thallium metal containing Tl 204 by aqueous oxygen. This development holds considerable promise for the analysis of dissolved oxygen in oceanographic, hydrological and water treatment studies.

RADIATION PASTEURIZATION OF FOODS

The Commission program to establish the technical and marketing feasibility of radiation pasteurized foods was initiated in March of 1960. This technology is aimed at extending the refrigerated shelf-life of perishable foods from several days to several weeks. Success in this effort would provide significant benefits in the civilian economy. The AEC program is designed around radiation pasteurization of a limited number of fruit and fish products with the intent that success with these will lead private industry and other Government agencies to expand the technology to a wide spectrum of food products. The design of the AEC program is based upon analysis of past research in this technology and identification of specific research and development requirements for successful completion of the program.

Research Results

Research results already obtained justify increasing confidence in the feasibility of radiation pasteurization of foods.

a. Test samples of both fruit and fish products have been radiation pasteurized under varied conditions and examined through laboratory analysis and taste panels. Haddock fillets and clams responded very favorably to radiation pasteurization, retaining high quality. In the case of clams, it has been possible to double the refrigerated shelf life.

b. Equally good results were obtained with the radiation pasteurization of fruits and especially strawberries. In particular, the vitamin C retention of radiation processed strawberries, important from a nutrition viewpoint, was found to be excellent. Promising results also were observed in the use of radiation to delay the ripening of fruits, thereby extending their marketable life.

c. It was found that desirable extensions of shelf life of both fish and fruits could be obtained with radiation doses substantially

lower than those originally believed necessary. These lower doses will enhance the economics of radiation pasteurization of foods, as well as further minimize the already negligible organoleptic effects.

Program Status

a. Implementation of the experimental program through contracts with nine universities, government agencies and private organizations.

b. Fabrication and installation of required research irradiators and conceptual design of other irradiation facilities foreseen as necessary for practical demonstration of this processing technology.

c. Establishment of both scientific and industrial advisory committees to assist in prosecution of the program.

d. Intensified cooperation and participation with several international organizations having vital interest in this technology.

Irradiator Design

Work progressed at Brookhaven National Laboratory on the design and fabrication of irradiators required to support the Radiation Pasteurized Foods Program.

a. Three research irradiators, each employing about 30,000 curies of Cobalt 60, were completed during the year. Installation of these irradiators has been completed at M.I.T. and the University of California and is in process at the University of Washington.

b. Conceptual design studies are in progress on two transportable irradiators, one employing about 100,000 curies of Cobalt 60 and the other a machine radiation source. It is expected the irradiators will have a production rate of 550 megarad pounds per hour, provide a dose uniformity of 1.5, and handle package sizes of 5" x 14" x 18". The irradiators would be utilized for a variety of products at various locations to advance process technology developed in the research program. Comparison of these two sources also would serve as a valuable aid to ultimate design of commercial units.

c. An initial report on other food irradiator design studies was submitted to the Joint Committee on Atomic Energy in March, 1961. Of

special interest is the Marine Products Development Irradiator, a facility of semi-production capability intended for location in one of the prime fish processing areas. The establishment and operation of this facility would constitute the final step in establishing the techno-economic feasibility of radiation pasteurization of marine products.

PROCESS RADIATION DEVELOPMENT

A deliberate Commission program on Process Radiation Development was initiated in mid-1958. It is aimed at making productive economic use of the vast quantities of radiation power available from isotopic sources especially fission products and is directed toward:

1. Seeking original radiation reactions through investigation of immediate very short-lived products of radiation interaction with matter and their mechanisms of reaction thereby establishing a substantial scientific foundation leading ultimately to production of unique radiation products.

2. Learning to design, construct and operate large kilowatt or megacurie radiation processing facilities through development of radiation as an engineering operation capable of treatment as an energy transfer process.

3. Finding ways of reducing radiation costs through development of techniques for increased efficiency of radiation utilization as well as through work on radiation source technology, i.e., the production handling, fabrication and encapsulation of radioisotope sources.

Design of the research plan being followed was based upon a critical study and analysis of world technology in this area and isolation of key scientific problems impeding the advancement of radiation in chemical process technology.

Radiation Engineering Development

Radiation engineering research and development has been largely centered at Brookhaven National Laboratory. New impetus to this aspect of radiation development has been achieved with the establishment of a Radiation Development Center at BNL. At the heart of the Center is the High Intensity Radiation Development Laboratory scheduled for completion in mid-1962. The HIRDL will employ about one million curies of Cobalt 60 and several hundred thousand curies of Cesium 137. With this facility the Radiation

Development Center will serve as a focal point for development of ionizing radiation as a major processing tool.

a. Research on source technology and standardization, radiation facility design, new radiation sources and high level dosimetry systems.

b. Compilation and technical interpretation of world technology pertinent to radiation development.

c. Expansion of research scientists participation in process radiation development at BNL by industrial, government and academic scientists.

Process Radiation Research

Radiation engineering must be accompanied by comparable research leading to ultimate establishment of specific applications in which radiation can be employed. The following are representative of process radiation research projects designed to meet this need:

a. Essential to the understanding of radiation reactions is the ability to identify the excited species existing within the time range of less than a millionith of a second after a radiation induced ionizing eventhas occurred. Heretofore this information has been impossible to obtain. After three years of research and development, however, a Coincidence Mass Spectrometer has been developed which has a sensitivity approximately a million times that of most other mass measuring instruments. It permits the determination of the specific charge carried by an individual ion molecule. It also permits the measurement of very rapid metastable decomposition reactions induced by ionizing radiation. Data have been obtained on the kinetics of such processes in the hundred nanosecond region. The unique operation of the apparatus lies in the coincidence principle which permits the identification of a particular ion with its ejected electron. The time lapse between the arrival of the electron at an electron collector and the arrival of the ion at the ion collector as a measure of the mass-to-charge ratio.

b. Ability to predict and control the course of radiation reactions is essential if this technology is to achieve widespread use. Work is in progress to formulate a rational theory related to the effect of compositional and structural factors in graft polymerization reactions on the formation of free radical sites. In a series of experiments involving the polymethacrates it has proved possible to formulate such a theory. This research is being expanded to other important classes of polymers.

c. Suspensoid and colloid systems exist widely in manufacturing processes. Availability of a reliable means to control such suspensoids or colloids would have very broad implications for use throughout the economy. In principle, radiation could affect such suspensoids or colloids by disrupting the electrical charge by which they are maintained. Sewage is representative of a colloidal system. An increase in the sedimentation rate of sewage would result in a considerable increase in sewage treatment plant capability. Work is in progress to determine whether radiation could be employed to increase the sewage sedimentation rate by neutralizing the colloids which prevent the suspended solids from settling. Preliminary experiments have resulted in a 20% increase in sewage sedimentation rate as a result of the radiation.

d. Use of radiation to improve the physical properties of naturally occurring products represents a broad area with potentially great benefit. Illustrative of such research is a current project involving impregnation of wood with an appropriate monomer followed by irradiation. This results in the formation of a "wood-plastic." Sugar maple hard wood and vinyl acetate treated in this manner resulted in an increase in weight of about 40% and greatly improved characteristics - 300% increase in hardness, 80% decrease in water absorption, 50 to 75% increase in dimensional stability and an increase of elastic limit by a factor of 2.

e. An important requirement for radiation utilization is to reduce the total radiation dose required to achieve a radiation reaction. This not only reduced radiation costs per pound of product but also permits the preparation of materials which would otherwise be demaged by high radiation doses. Illustrative of this area of activity is the use of polyfunctional monomers to bring about a crosslinking reaction in polymers. Instead of a direct crosslink between the polymer chains, which would require a prohibitively high radiation dose, the crosslink occurs by coupling of the monomer chains across the polyfunctional monomers. This technique has produced monomer polymer gels up to 80% with less than a 5 megarad dose. Recent work has shown that polyethylene allyl methacrylate systems irradiated to 1.5 megarads have 100°C tensile strengths equal to that of 15 megarad monomer-free polyethylene. Other such systems irradiated to 2.3 megarads are equivalent to about 50 megarad monomer-free polyethylene.

f. Exploitation of possible synergistic effects of radiation when used in conjunction with other processing agents offers a key means for making new or improved materials. It can be postulated that use of radiation with heat, pressure, catalysts, etc., might

yield results either not observed if these agents were used individually or in greater degree than either one alone. Just such effects have been observed in research being conducted on the radiolysis of silane to produce ultimately pure silicon. Silane can be decomposed to silicon metal by heat alone. Through concurrent use of radiation, however, the temperature requirement can be reduced by one half. Additionally, because of the lower temperature fewer impurities are introduced through the silicon material by diffusion from the reaction vessel.

ISOTOPE TECHNOLOGY TRAINING

Expansion of educational and training opportunities in radioisotope technology is a necessary adjunct of a research program designed to extend use of radioisotope and radiation techniques. Beginning in 1958, specific activities were designed to meet the urgent need for training physical and engineering scientists in the use of radiation techniques. A parallel effort was also established to assure that the nation's colleges and universities would have the capability to include radioisotope and radiation technology routinely in established physical science curricula.

I. Industrial Training

A. The first courses specifically emphasizing the techniques of using radioisotopes in industry were offered at the Oak Ridge Institute of Nuclear Studies beginning in February 1959.

B. Equipment grants to colleges and universities for academic training also stimulated at least six schools to offer specific courses for training local industry personnel in various geographical areas.

C. Distribution rights were obtained for the pioneering General Motors "Radioisotopes in Industry - Training Program." High industrial interest in this prototype training tool necessitated several reprintings.

II. Industrial Orientation and Information

A. Twenty-two symposia and workshops on the industrial applications of radioisotopes have been held within the last three years, from coast to coast, with other 3500 management and technical personnel in attendance.

B. The first extensive analysis of world literature on industrial applications of radioisotopes and radiation was begun. Feedback of information to industry was assured through development of standard distribution techniques and by periodic publication of assembled data in bibliographic report form.

C. Comprehensive reference guides to basic sources of information on isotopes and radiation were prepared on a periodic basis. One such publication -- TID-4563, "Special Sources of Information on Isotopes" -- has received world-wide distribution and is recognized as the most comprehensive listing of basic information sources in this area of nuclear science.

III. Educational Assistance to Colleges and Universities

A. Initial Commission attention was given to the need of liberal colleges of arts and sciences for assistance in placing meaningful course work in the use of radioisotopes throughout the physical sciences. Prior to consolidation of overall equipment grant activities in the physical and engineering sciences, 76 colleges and universities received approximately $1 million to upgrade existing physical sciences curricula.

B. Recognizing the urgent need to equip small colleges to offer instruction in the use of radioisotope techniques, a cooperative program with the National Science Foundation provided the basis for a summer institute program with selected small college faculty in attendance. Eight such institutes have been held, applications for admittance continue to far outstrip available training resources, and over 200 instructors of chemistry and physics have received this basic introduction to isotope and radiation theory.

IV. Course Development

A. The first full-fledged laboratory manual on radioisotopes for use in college and university chemistry courses was published. "Radioisotope Experiments for the Chemistry Curriculum" has received a high degree of national and international recognition, with translation permission given in response to requests from France and Spain.

B. The first course in basic and applied isotope technology was prepared. "Short Course in Basic and Applied Isotope Technology," has provided a basic reference source and instructors guide.

C. A series of engineering drawings related to training in radioisotope engineering for colleges and universities has been made available. Twelve prototype instruments have been developed to demonstrate a variety of principles and uses of radioisotopes and radiation. Working models of these instruments may be built from the drawings for laboratory use.

D. A laboratory manual of experiments and demonstrations in basic and applied high intensity radiation techniques is under development for use in advanced undergraduate and graduate instruction.

V. Training Films

A. A 57-minute color film was produced to survey the industrial uses of radioisotopes in selected plants from coast to coast. The film has been widely acclaimed, has been translated into German, Japanese, Portuguese, and is one of the most actively sought after films in the Commission's motion picture library.

B. A popular version of the above film "Opportunity Unlimited" was produced for use on public service TV and for use at the community level.

C. The first two segments of a planned 10 program series on the fundamentals of radiation have been produced for instructional TV. These are the only instructional TV films produced by the Commission to date.

FORM AEC-204
(9-47)

DATE:

INDEX: Isotopes 3

[redacted]

TO:

FROM:

SUMMARY: Ltr. frm. Mr. McCone, CIA, to AEC re discussions with the Div. of Isotope Devel. suggesting that a feasibility study be made of a unique application of radioisotopes in a non-electronic voice recorder.

FILED: C&R 9

INDEXER: date of ltr: 2-12-62

REMARKS:

CONFIRMED TO BE UNCLASSIFIED
DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY JOI E. BUCKNER DOE/NN-523

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

2-12-62

☆ U. S. GOVERNMENT PRINTING OFFICE—1955—362508

AEC

Lentpar-3

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. E-3
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Thursday, January 4, 1962)

AEC WILL PARTICIPATE IN LOUISIANA CONFERENCE ON RADIOISOTOPES IN INDUSTRY

Louisiana State University will sponsor, with the cooperation of the U. S. Atomic Energy Commission, a conference on radioisotopes in industry in Baton Rouge, Louisiana, on January 11 and 12.

During the two-day meeting, speakers will discuss the management, economic and technical considerations of industrial radioisotope tracing, gauging, radiography and process radiation. Radioisotope tracing uses the continuous radiation from mixed or dissolved radioisotopes to follow materials through industrial processes. Gauging makes use of the transmission or reflection of radioisotope radiation to measure the thickness, density or levels of materials. Isotopic radiography is similar to X-ray inspection but uses penetrating gamma radiation. Ionizing radiation from radioisotopic sources is used to supply the energy for chemical or physical changes in materials.

Those attending the conference will be provided with up-to-date information on the many possible industrial applications of radioisotopes. Particular emphasis will be on improvements in research, production and control; educational and training requirements and opportunities; and health and safety aspects of radioisotope use. In addition, a series of brief experience reports by local industrial users will be included.

Management representatives, scientists, engineers and educators working or interested in these technical areas are encouraged to attend. Detailed information on the conference may be obtained from Harry D. Richardson, Director, Nuclear Science Center, Louisiana State University, University Station, Baton Rouge 3, Louisiana.

- 30 -

1/4/62

1-4-62

AEC

Isotopes-3

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. D-283
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Tuesday, October 31, 1961)

AEC WILL PARTICIPATE IN CONFERENCE ON RADIOISOTOPES - NEW TOOLS FOR INDUSTRY

The Commonwealth of Massachusetts Commission on Atomic Energy and the Greater Boston Chamber of Commerce will co-sponsor a conference on industrial uses of radioisotopes, in cooperation with the U. S. Atomic Energy Commission. The meeting will be held at the Sheraton Plaza Hotel in Boston, on November 14-15.

Papers to be presented at the conference will provide up-to-date information on important industrial applications of radioisotopes. Particular emphasis will be on improvements in production and efficiency obtained by radioisotope tracing, gauging and radiography techniques; radiation as a processing tool; educational and training requirements and opportunities; and the health and safety aspects of radioisotope use. In addition, a series of brief experience reports by local industrial users will be included.

Management representatives, scientists, engineers and educators, working or interested in these technical areas are encouraged to attend. Detailed information on the conference may be obtained from Mr. Walter Knight, Greater Boston Chamber of Commerce, 125 High Street, Boston 10, Massachusetts.

- 30 -

10/31/61

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UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. D-269
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Thursday, October 19, 1961)

AEC WILL PARTICIPATE IN SEMINAR ON RADIOISOTOPES - NEW HORIZONS IN THE MINERAL INDUSTRIES

The Mineral Industries Division of the Pittsburgh section of the American Institute of Metallurgical Engineers will sponsor, in cooperation with the U. S. Atomic Energy Commission, a seminar on radioisotopes in the mineral industries. The meeting will be held at the Penn-Sheraton Hotel, in Pittsburgh, on November 3, 1961.

During the one-day meeting, speakers will discuss the management, economic and technical considerations of radioisotope tracing and gauging applications in the various segments of the mineral industry. Radioisotope tracing uses the continuous radiation from mixed or dissolved radioisotopes to follow materials through industrial processes. Gauging makes use of the transmission or reflection of radioisotope radiation to measure the thickness, density or levels of materials.

Since radioisotopes have proved to be valuable tools in broad industry applications, their use in mineral processing is a natural extension of this technology. Individual meeting sessions will include radioisotope applications in ore exploration and mineral processing.

Among the topics to be covered are the use of radiation sources to identify the nature of geological strata and specific minerals, the use of nuclear gauges to determine the physical levels of materials, the density of suspended ores, and the moisture content of mineral concentrates undergoing processing. In addition, the broad range of radiotracer applications in metallurgical processing will be discussed.

(more)

10-19-61

Management representatives, scientists, engineers and educators working or interested in these technical areas are encouraged to attend. Detailed information on the seminar may be obtained from Mr. Robert G. Redelfs, Chairman, Mineral Industries Group, St. Joseph Lead Company, Zinc Smelting Division, Monaca 7, Pennsylvania.

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10/19/61

Isotopes 3

UNCLASSIFIED

September 13, 1961

AEC 994/9

COPY NO. 48

ATOMIC ENERGY COMMISSION

INDUSTRIAL RADIOISOTOPE ACTIVITIES

Note by the Secretary

The attached letter from the Vice President, Research Laboratories, General Motors Corporation, is circulated for the information of the Commission. The letter has been referred to the General Manager for appropriate handling.

W. B. McCool
Secretary

DISTRIBUTION	COPY NO.
Secretary	1
Commissioners	2 - 6,53
General Manager	7
Dir., of Regulation	8
Deputy Gen. Mgr.	9
Asst. Gen. Mgr.	10 - 11
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AEC 994/9

9-13-61

UNCLASSIFIED

RESEARCH LABORATORIES
GENERAL MOTORS CORPORATION

August 11, 1961

Dr. Glenn T. Seaborg
Chairman
United States Atomic Energy Commission
Washington 25, D. C.

Dear Glenn:

I wish to thank you again for the time which you and your people gave us on August 10. It was a real pleasure to see you and to have the opportunity to acquaint you with our industrial radioisotope activities, and our research and development program on low energy photon sources. We believe that such sources have great potential utility and can constitute an important contribution to the peaceful uses of atomic energy both here and in foreign countries. Their potential medical utility seems to have very far-reaching implications.

As we indicated to you in our meeting, our industrial effort would probably not exist today if it were not for the Atomic Energy Commission's farsighted decisions in supporting the Special Training Division of the Oak Ridge Institute of Nuclear Studies, in making radioisotopes available to industry and medicine, and in making space in A.E.C. reactors available to others for experimental use. We are also indebted to many outstanding people and groups in the A.E.C. for suggestions, technical advice, and helpful cooperation. The Office of Isotopes Development, under Dr. Paul C. Aebersold, has been particularly helpful and encouraging in our industrial efforts.

The care and efficiency of the isotope people at Oak Ridge National Laboratory's Oak Ridge Research Reactor in using their years of experience to irradiate isotope research samples for study in our laboratory have contributed significantly to basic nuclear data and the state-of-the-art in our low energy source endeavors.

Before and after you left us we discussed areas where cooperative effort with the A.E.C. might facilitate this source program. For the present we feel that a continuance of A.E.C. cooperation in the manner and to the extent given in the past is adequate. This includes the continued availability particularly of modest quantities of enriched stable isotopes and space in the O.R.R. for irradiation of research and development samples.

If our sources program is expanded, then we shall seriously explore several suggestions which Dr. Aebersold and others made concerning cooperative efforts in decay scheme studies, source calibration, reliability testing, device safety, and also provisions for producing multi-gram quantities of enriched stable isotopes. At the present time, however, it would be unfair for us to stimulate your people to perform work until our future course of action has been more clearly delineated.

UNCLASSIFIED

You might be interested to know that your compilations of nuclear data originally published in REVIEWS OF MODERN PHYSICS have contributed significantly to progress in our Research Laboratories. Even today, after the publication of Nuclear Data Sheets by the National Academy of Sciences, your data tables are the most used, single source of nuclear information.

Sincerely,

/s/ L. R. Hafstad

L. R. Hafstad
Vice President

Isotopes-3

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. D-108
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Tuesday, May 2, 1961)

AEC WITHDRAWS FROM ROUTINE PRODUCTION OF COBALT-60

The Atomic Energy Commission is withdrawing from the routine production and distribution of cobalt-60, effective immediately. This is in accordance with the Commission's general policy to discontinue providing material or services which are reasonably available from commercial sources.

Cobalt-60, in quantities sufficient to meet ordinary demands, is now being produced in the test reactors of the Westinghouse Electric Corp. and General Electric Company for radiography, teletherapy and other common applications.

To encourage development of ionizing radiation as a major processing tool, the AEC will continue to provide cobalt-60 (up to a specific activity of 30 curies per gram) in quantities greater than 100,000 curies. This will be done on a custom order basis where the customer is prepared to accept the material in a single shipment. This material is priced at $1 per curie. The price schedule for other than 100,000 curie quantities of cobalt-60, established September 9, 1960, is no longer in effect for cobalt-60 supplied from AEC facilities.

The AEC will consider providing cobalt-60 of the type and in the quantity employed in radiography, teletherapy and other commercial applications only when it is demonstrated by the purchaser that the supply of such material from private sources is not reasonably adequate. Under these circumstances the cobalt-60 will be priced at the AEC full cost, or at reasonable private rates, whichever are higher. On this basis, the AEC charges are:

(more)

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12 c.5

Specific Activity (curies per gram)	List Price per Curie
1-25	$ 2.00
26-40	3.00
41-55	4.00
56-70	6.00

Discounts	
0-5000 curies	List Price
5001-25,000 curies	List Price less 15%
25,001-100,000 curies	List Price less 30%

The above list does not include handling or service charges.

These prices are substantially the same as those announced on September 9, 1960, except that the discounts on larger purchases are lower -- list price less 15% rather than 25% on 5,001 to 25,000 curies, and list price less 30% rather than 50% on 25,001 to 100,000 curies.

Major encapsulators of cobalt-60 sources greater than 100 curies are listed below.

LARGE COBALT-60 SOURCE (OVER 100 CURIES) COMMERCIAL ENCAPSULATIONS IN THE UNITED STATES

Admiral Corporation
3800 Cortland Street
Chicago 47, Illinois

The Budd Company
Instruments Division
Box 245
Phoenixville, Pennsylvania

Gamma Industries, Inc.
P. O. Box 2543
2255 Ted Dunham
Baton Rouge, Louisiana

General Electric Company
Atomic Products Division
Atomic Power Equipment Department
2151 South First Street
San Jose 12, California

Isotopes Specialties Company
Division of U. S. Nuclear Corp.
P. O. Box 688
170 West Providencia
Burbank, California

Nucledyne Division
Cook Electric Company
3412 River Road
Franklin Park, Illinois

(more)

Picker X-Ray Corporation
Waite Manufacturing Division, Inc.
17325 Euclid Avenue
Cleveland 12, Ohio

U. S. Nuclear Corporation
P. O. Box 208
801 N. Lake Street
Burbank, California

Westinghouse Electric
Corporation
Testing Reactor
P. O. Box 1075
Pittsburgh 30, Pennsylvania

Nuclear Research Corporation
Southampton, Pennsylvania

- 30 -

(NOTE TO EDITORS AND CORRESPONDENTS: This information is being issued simultaneously by the Commission's Oak Ridge Operations Office, Oak Ridge, Tennessee.)

5261

Secretary to the Commission

MAY 2 1961

Dear Mr. President:

The Commission has given careful consideration to Mr. George White's wire of September 19, 1960, to Chairman McCone and to your letter to me of March 3, 1961.

As you may know, it is the Commission's policy not to sell by-product material to the public to the extent this material is available from private sources at reasonable prices that will not discourage use or research and development. This policy covers cobalt 60.

After reviewing the current cobalt 60 price schedules of private producers the Commission has determined that the following private rates, which are somewhat higher than AEC's present prices, are reasonable and should not discourage use or research and development:

Specific Activity (Curies/gram)	List price per curie
1-25	$ 2.00
26-40	3.00
41-55	4.00
56-70	6.00

Quantity Purchased (curies)	Net price per curie
0-5,000	List price
5,001-25,000	List price less 15%
25,001-100,000	List price less 30%

You will note that although the General Electric Company's list prices are $1 per curie higher in the 26 curies per gram to 55 curies per gram range, the above discount schedule is the same as GE's.

AEC will not sell cobalt 60 to the public to the extent it is available from private sources at prices that do not exceed those indicated above.

AEC 994/7 encl 18

5-3-61

When the supply from these sources at these prices is inadequate, AEC will satisfy the remainder of the need at these same prices.

The Commission will continue to produce and provide cobalt 60 on a custom order basis up to a specific activity of 90 curies per gram in quantities greater than 100,000 curies at $1 per curie where the customer is prepared to accept the material in a single shipment.

A press release announcing the foregoing actions is enclosed for your information.

Sincerely yours,

/s/ L. K. Olson

Commissioner

Mr. Ray Freeman
General Electric Company
777 - 14th Street N. W.
Washington 5, D. C.

Enclosure:
Press release

cc: Com. Olson
AGMRTD
Gen. Mgr.
Secretary

DID,RPD Blackwell ✓ /61.

DID,DS Fowler ✓ /61.

RECEIVED
U. S. Atomic Energy Commission
Office of the Secretary
MAY 3 1961

DID,D ✓ /61. FIN. / CIO ✓ /61. AGMRTD ✓ /61. MGR ✓ /61. DCK ✓ /61. GS ✓ /61.

ABCDEFGHIJKLM

Sentpt-3

APR 28 1961

Secy to Comm

Dear Mr. Holifield:

This is to inform the Committee that the Commission is withdrawing from the routine production and distribution for non-AEC purposes of cobalt 60 of the type employed in radiography, radiotherapy and other common commercial applications to the extent such material is made available by private sources at prices not exceeding those set forth in the attached press release.

This action has been taken in view of the availability of cobalt 60 from private test reactors and the Commission's policy of discontinuing provision of by-product materials to others when these become available from private sources at reasonable prices. The price schedule referenced in the press release was determined to be reasonable after reviewing the current cobalt 60 prices of private producers and considering that this schedule, although higher than AEC's previous prices, nevertheless should not discourage use or research and development.

To encourage development of leading radiation as a major processing tool the Commission will continue to produce and provide cobalt 60 on a custom order basis (up to a specific activity of 30 curies per gram) in quantities greater than 100,000 curies at $1. per curie where the customer is prepared to accept the material in a single shipment.

Sincerely yours,

SIGNED, R. E. HOLLINGSWORTH

General Manager

DCP:OGC	DD:OXD	OGC	FIN Deputy	
~~GM/CHAIRMAN~~	Yeager			
4/26/61	4/ /61	4/ /61	4/ /61	

Honorable Chet Holifield
Chairman, Joint Committee on Atomic Energy
Congress of the United States

Enclosure:
Press Release

D:OXD	CONG.LIAS.	GC/FIN	ADMIN	ADM/XXX	GM
Abernald					
4/ /61	4/ /61	4/ /61-4/ /61	4/ /61	4/ /61-4/ /61	4/ /61

AEC994/1 and 2

4-28-61

AEC WITHDRAWS FROM ROUTINE PRODUCTION OF COBALT-60

The Atomic Energy Commission is withdrawing from the routine production and distribution of cobalt-60, effective immediately. This is in accordance with the Commission's general policy to discontinue providing material or services which are reasonably available from commercial sources.

Cobalt-60, in quantities sufficient to meet ordinary demands, is now being produced in the test reactors of the Westinghouse Electric Corp. and General Electric Company for radiography, teletherapy and other common applications.

To encourage development of ionizing radiation as a major processing tool, the AEC will continue to provide cobalt-60 (up to a specific activity of 30 curies per gram) in quantities greater than 100,000 curies. This will be done on a custom order basis where the customer is prepared to accept the material in a single shipment. This material is priced at $1 per curie. The price schedule for other than 100,000 curie quantities of cobalt-60, established September 9, 1960, is no longer in effect for cobalt-60 supplied from AEC facilities.

The AEC will consider providing cobalt-60 of the type and in the quantity employed in radiography, teletherapy and other commercial applications only when it is demonstrated by the purchaser that the supply of such material from private sources at the prices stated below is not reasonably adequate. Under these circumstances the cobalt-60 will be priced at the AEC full cost, or at reasonable private rates, whichever are higher. On this basis, the AEC charges are:

Specific Activity (curies per gram)	List Price per Curie
1-25	$ 2.00
26-40	3.00
41-55	4.00
56-70	6.00

Discounts

0-5000 curies	List Price
5001-25,000 curies	List Price less 15%
25,001-100,000 curies	List Price less 30%

The above list does not include handling or service charges.

These prices are substantially the same as those announced on September 9, 1960, except that the discounts on larger purchases are lower -- list price less 15% rather than 25% on 5,001 to 25,000 curies, and list price less 30% rather than 50% on 25,001 to 100,000 curies.

Major encapsulators of cobalt-60 sources greater than 100 curies are listed below.

LARGE COBALT-60 SOURCE (OVER 100 CURIES) COMMERCIAL ENCAPSULATORS IN THE UNITED STATES

Admiral Corporation
3800 Cortland Street
Chicago 47, Illinois

The Budd Company
Instruments Division, Box 245
Phoenixville, Pennsylvania

Gamma Industries, Inc.
P.O. Box 2543
1235 Tom Dunham
Baton Rouge, Louisiana

General Electric Company
Atomic Products Division
Atomic Power Equipment Department
2151 South First Street
San Jose 12, California

Isotopes Specialties Company
Division of U. S. Nuclear Corp.
P.O. Box 608
170 West Providencia
Burbank, California

Nuclear Research Corporation
Southampton, Pennsylvania

Nucleonics Division
Cook Electric Company
3412 River Road
Franklin Park, Illinois

Picker X-Ray Corporation
Waite Manufacturing Division, Inc.
17523 Euclid Avenue
Cleveland 12, Ohio

U. S. Nuclear Corporation
P.O. Box 208
801 W. Lake Street
Burbank, California

Westinghouse Electric Corporation
Testing Reactor, P.O. Box 1073
Pittsburgh 30, Pennsylvania

Large Encapsulated Cesium 137
Sources Available From:
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, Tennessee

Isotopes 3 Ref - Sec

OPTIONAL FORM NO. 10
5010-108

UNITED STATES GOVERNMENT

Memorandum

~~OFFICIAL USE ONLY~~

TO : Paul C. Aebersold, Director
Office of Isotopes Development

DATE: April 26, 1961

FROM : W. B. McCool, Secretary

SUBJECT: AEC 994/7 & 994/8 - SUPPLY OF COBALT-60 BY INDUSTRY

SYMBOL: SECY:DCR

1. We informed your office on April 26, 1961, that at Meeting 1730 on April 25 the Commission:

a. Approved AEC withdrawal from the production and distribution of cobalt 60 to the extent it is available from private facilities in accordance with the plan set forth in paragraph 13 of AEC 994/7;

b. Noted that the references to AEC withdrawal when materials and services are reasonably available from private sources means also that the prices are not unreasonable;

c. Noted that the AEC will retain the option of producing cobalt 60 to meet its own requirements;

d. Noted that the Joint Committee on Atomic Energy will be notified of this action by appropriate letter;

e. Noted that a public announcement similar to that attached as Appendix "D" to AEC 994/7 will be issued;

f. Noted that a letter such as Appendix "D" to AEC 994/8 will be sent to the General Electric Company; and

g. Noted that AEC 994/7 and AEC 994/8 are unclassified.

2. The General Manager has directed you to take the action required by the above decision. It is our understanding that your office will prepare the correspondence to the JCAE and General Electric Company. Copies of these letters together with other pertinent correspondence should be provided the Office of the Secretary.

cc: General Manager
Deputy General Manager
Asst. General Manager
Asst. Gen. Mgr. for R&ID
General Counsel
Director, Public Information
Congressional Relations

~~OFFICIAL USE ONLY~~

4-26-61

Mtg. 1730
4-25-61
~~SECRET~~

3. AEC 994/7 and AEC 994/8 - Supply of Cobalt 60 by Industry

The General Manager briefly reviewed the recommendations contained in AEC 994/7, which considered AEC withdrawal from the production and distribution of Cobalt 60 available from private industry facilities and AEC 994/8, which considered the AEC price for Cobalt 60 not adequately available from private sources. Commissioner Graham inquired it it were probable Atomic Energy of Canada, Ltd. (AECL) would increase its price for plutonium comparably with GE and Westinghouse rate charges after Commission withdrawal from Cobalt 60 production as proposed in AEC 994/7. Commissioner Wilson said in view of AECL's earlier request* that the Commission not reduce Cobalt 60 prices, he conjectured AECL would increase its prices to the level of Westinghouse and GE prices.

The Commission:

a. Approved AEC withdrawal from the production and distribution of Cobalt 60 to the extent it is available from private facilities in accordance with the plan set forth in paragraph 13 of AEC 994/7;

b. Noted that the references to AEC withdrawal when materials and services are reasonably available from private sources means also that the prices are not unreasonable;

c. Noted that the AEC will retain the option of producing Cobalt 60 to meet its own requirements;

d. Noted that the Joint Committee on Atomic Energy will be notified of this action by appropriate letter;

e. Noted that a public announcement similar to that attached as Appendix "D" to AEC 994/7 will be issued;

f. Noted that a letter such as Appendix "D" to AEC 994/8 will be sent to the General Electric Company; and

g. Noted that AEC 994/7 and AEC 994/8 are unclassified.

CONFIRMED TO BE UNCLASSIFIED
DOE NSI DECLASSIFICATION REVIEW E.O. 13526
BY: RLSharpe BJ 504 US-63 9/24/12 DOE/OC

4-25-61

Files

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D. C.

Done

April 19, 1961

MEMORANDUM FOR ALL HOLDERS OF AEC 994/8

1. Copy (ies) 52 of AEC 994/8 was (were) distributed to your office on April 18, 1961.

2. The Office of Isotopes Development has requested that the following correction be made in AEC 994/8:

> On page 6, in the "Discount Schedules" table, the AECL discount in the "25,001-100,000" column should be "50%" instead of "30%".

W. B. McCool

Secretary

4/19/61

Files

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C.

April 19, 1961

MEMORANDUM FOR ALL HOLDERS OF AEC 994/7

1. Copy (ies) 44 of AEC 994/7 was (were) distributed to your office on March 10, 1961.

2. Holders of AEC 994/7 are requested to substitute the attached revised pages pages 4, 12, and 13 for those now in the paper. The changes, consisting of revision of sub-paragraph 13d on page 4 and paragraph 4 on page 12, are made to up-date AEC 994/7 to reflect receipt of Westinghouse Electric Corporation's price schedule, as discussed in AEC 994/8.

W. B. McCool
Secretary

Attachment:
Revised pages

Name.....

See file.....

Date.....

Subject:

Form WA-137
(6-51)

CONTROL CARD
U. S. ATOMIC ENERGY COMMISSION

16—61795-1 GPO

OFFICIAL ~~USE~~ ONLY

April 18, 1961

AEC 994/8

COPY NO. 52

ATOMIC ENERGY COMMISSION

SUPPLY OF COBALT-60 BY INDUSTRY

Note by the Secretary

1. The General Manager has requested that the attached report by the Director of Isotopes Development, supplementing AEC 994/7, be circulated for consideration by the Commission at an early date.

2. AEC 994/7 has been revised to reflect the discussion in the attached report.

W. B. McCool
Secretary

DISTRIBUTION	COPY NO.
Secretary	1
Commissioners	2 - 6,57-58
General Manager	7
Deputy Gen. Mgr.	8
Asst. Gen. Mgr.	9 - 10
Asst. Gen. Mgr. R&ID	11 - 12
Asst. Gen. Mgr. Adm.	13
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Research	45
Oak Ridge Oprns.	46 - 48
D. C. Office	49 - 51
Secretariat	52 - 56

AEC 994/8

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ATOMIC ENERGY COMMISSION

SUPPLY OF COBALT 60 BY INDUSTRY

Report to the General Manager by the Director of Isotopes Development

THE PROBLEM

1. To reconsider AEC 994/7, Supply of Cobalt 60 by Industry.

SUMMARY

2. Since the Commission's deferral of AEC 994/7 at Meeting 1713 on March 14, 1961, the Westinghouse Electric Corporation's cobalt-60 price schedule (Appendix "A") has been received. Their base or list prices are identical with those of AEC (although the quantity discounts differ) and currently represent the lowest domestic private rate. It is understood these prices are based upon producing cobalt-60 as a by-product material resulting from using cobalt metal to improve technical operation of the reactor. Comparative cobalt-60 price schedules are attached as Appendix "B".

3. At issue, if the recommendations of AEC 994/7 are approved is whether supply by AEC of cobalt 60 not adequately available from private sources should be at current AEC prices; or whether the Westinghouse rates are reasonable and therefore should be adopted by AEC. Resolution of the problem should be based upon consistency of the proposed solution with present Commission policies (approved by the Commission at Meeting 1644 on August 17, 1960, after consideration of AEC 720/96) whereby:

> "Radioisotopes produced in AEC facilities shall be priced at the higher of full cost recovery or reasonable, competitive, commercial prices so long as these prices are consistent with Section 81 of the Atomic Energy Act which requires that prices be established on such equitable basis as, in the opinion of the Commission, (a) will provide reasonable compensation to the Government for such material, (b) will not discourage the use of such material or the development of sources of supply of such material independent of the Commission, and (c) will encourage research and development."

4. Retention of the current AEC price schedule, including discounts, would continue cobalt 60 market prices somewhat lower than those of GE or Westinghouse. However, this course of action would be inconsistent with Commission policies in paragraph 3 above

5. The Westinghouse prices are sufficiently similar to presen AEC prices that they can be properly interpreted as being equally consistent with Section 81 of the Act and therefore represent a reasonable rate. Moreover, adoption of AEC prices identical to those of Westinghouse would be in accordance with the above referenced Commission policies. Although under this plan GE's list prices would be a dollar per curie higher, the AEC discount schedule would be consistent with that of both GE and Westinghouse.

6. It should be noted that the ability of the companies to market cobalt-60 is influenced by provisions of the AEC contract with Westinghouse and draft contract with GE for test irradiation services. Relevant factors are set forth in Appendix "C".

STAFF JUDGMENTS

8. The Division of Finance and Office of Contract Policy concur in the recommendation of this paper. The Division of Reactor Development concurs insofar as the paper discusses irradiation services contracts but otherwise takes no position. The Office of the General Counsel has no legal objection.

CONCLUSIONS

9. By virtue of consistency with Section 81 of the Act and the Commission policy referenced in paragraph 3 above, AEC should adopt a cobalt 60 price schedule identical to that of Westinghouse. Action on the recommendation of AEC 994/7 should be taken without awaiting negotiation of test irradiation service contract revisions referenced in Appendix "C" to this paper.

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RECOMMENDATION

10. The General Manager recommends that the Atomic Energy Commission:

a. Approve the recommendations of AEC 994/7;

b. Note that a letter such as Appendix "D" will be sent to the General Electric Company;

c. Note that this paper is unclassified.

LIST OF ENCLOSURES

		PAGE
APPENDIX "A"	- Westinghouse cobalt 60 Price Schedule	4
APPENDIX "B"	- Comparative cobalt 60 Price Schedule	6
APPENDIX "C"	- Relevance of test irradiation service contract provisions	7
APPENDIX "D"	- Draft Reply to the General Electric Company.	10
APPENDIX "E"	- Telegram of Sept. 19, 1960, from George White	12
APPENDIX "F"	- Letter dated March 3, 1961, from R. C. Frieman	14

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APPENDIX "A"

WESTINGHOUSE
ELECTRIC CORPORATION
P.O. BOX 1075
PITTSBURGH 30, PA.

March 24, 1961

Mr. E. Eugene Fowler, Deputy Director
Office of Isotopes Development
U.S. Atomic Energy Commission
Washington 25, D. C.

Subject: WTR Cobalt-60 Price Schedule

Dear Mr. Fowler:

This will confirm our telephone conversation today in which I advised that the WTR intends to produce a minimum of 75,000 curies of cobalt-60 a year. The price schedule that I gave you is listed below:

Specific Activity (curies per gram)	List Price Per Curie
1-25	$ 2.00
26-40	3.00
41-55	4.00
56-70	6.00
Higher Activities	Will be Negotiated

Discounts

0-5000 curies	List Price
5001-25,000 curies	List Price less 15%
25,001-100,000 curies	List Price less 30%
Larger Quantities	Will be Negotiated

Handling and Source Selection Charge	$100 Net
Minimum Order	1000 Net

Delivery on individual orders must be accepted within one year from date of initial shipment.

Terms are net 30 days. Prices are FOB Waltz Mill Pa. with freight collect. Customer must furnish shipping casks.

Prices apply to Bulk Shipment on cobalt-60 in the following sizes will be negotiated.

Diameter	Length
* 1 cm	1 mm
* 2 cm	1 mm
1/8 in.	1/8 in.
1/8 in.	1/4 in.

* Normal Production

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I hope that this information will satisfy your requirements. I am sorry that I could not forward this price schedule to you earlier.

Sincerely yours,

/s/

R. J. McDevitt, Manager
Contract Administration
and Project Engineering

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APPENDIX "B"

Comparative Cobalt 60 Price Schedules

List Prices

	1-25 c/g	26-40 c/g	41-55 c/g	Greater 55 c/g
AEC	$ 2.00	$ 3.00	$ 4.00	N.A.
WTR	2.00	3.00	4.00	$ 6.00 up
GE	N.A.	4.00	5.00	6.00 up
AECL	2.00	3.00	4.00	4.20 up

Discount Schedules

	0-5000 curies	5001-25,000	25,001-100,000	Greater 100,000
AEC	List	25%	50%	$1.00/curie flat rate
WTR	List	15%	30%	Negotiated
GE	List	15%	30%	35%
AECL	List	25%	50%	On request

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APPENDIX "C"

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

MEMORANDUM

TO : A. Tammaro, Assistant General Manager for Research and Industrial Development

FROM : Frank K. Pittman, Director Division of Reactor Development

SUBJECT: PROPOSED COURSE OF ACTION RELATING TO TEST IRRADIATION SERVICES CONTRACTS

SYMBOL : RD:ADM:C:DAL

I propose the following course of action in changing the test irradiation services contracts to assure that they will not become a detriment to the commercial production of Cobalt 60.

1. I propose to instruct Idaho to clarify the "most favored nations" clause (this and "reactor utilization" are described in the attachment) in the General Electric contract prior to its execution to assure that the parties understand that Cobalt 60 production is not within the ambit of this provision. (Cobalt 60 is not included in "reactor utilization" in this contract.)

2. It has been proposed that the "reactor utilization" arrangement and the "most favored nations" clause in the Westinghouse contract be changed at once so that there are no deterrents to the commercial production of Cobalt 60. Counsel has pointed out that such a change requires legal consideration. Various schemes have been proposed, short of adjustments in price, to overcome this legal difficulty. These have not fulfilled the requirements.

The Westinghouse contract will expire on September 22, 1961 (less than six months from now). Westinghouse presently produces annually 75,000 curies of Cobalt, "principally for technical operations". Within the framework of the present contract, Westinghouse could possibly produce 125,000 to 150,000 curies within the ambit of the technical operations provision. The present annual market of common-use Cobalt is estimated to be 400,000 curies for 1961 and 500,000 in 1962. AECL presently has over 50% of the market. The market for American producers is therefore between 200,000 - 250,000 curies. Assuming an equal division, Westinghouse's share of the market would be 100,000 to 125,000 curies. (General Electric presently has a contract for 275,000 curies of which 50,000 have been delivered.) This could be produced within the limits of requirements for technical operations. Cobalt produced by technical operations is not within the coverage of the most favored nations" clause.

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Additionally, it must be pointed out that Westinghouse probably could not produce, within the remaining months of the contract, this number of curies of Cobalt 60. Even if this amount of Cobalt was assumed to be within the utilization base it would not affect Westinghouse's revenue from AEC. With the present load in the Westinghouse reactor of 5%, Westinghouse can produce approximately 450,000 curies of Cobalt without reaching the next step reduction in price. In view of the market situation we believe our present contract does not affect nor deter the sale of Cobalt 60 by Westinghouse during its present term.

It is our recommendation, therefore, that upon its expiration appropriate adjustments be made in the contract with Westinghouse so that it is essentially comparable with the GE contract as respects Cobalt 60 production. At that point there will be no question of legal consideration.

In light of the above it is requested that you encourage the General Manager to approve my memorandum of April 3, 1961, concerning execution of the GETR contract.

Attachment:
"A" DEFINITIONS

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ATTACHMENT "A" TO APPENDIX "C"

DEFINITIONS

Reactor Utilization

"Reactor utilization" is the total number of 'Irradiation Units' that would have been utilized during a given operating cycle by (i) the Commission and its designees, (ii) all third parties, and (iii) the Contractor except in cases where the utilization is for the principal purpose of improving technical operations at the Reactor - if the Reactor had been operated at nominal full power for 528 hours during that cycle.

Most Favored Nations

The "most favored nations" clause provides that the prices and charges specified are no higher than the net prices and charges charged to the contractor's most favored third parties for comparable work and services. In the event that the Contracto at any time when the contract is in effect, should charge any third party a price or charge which is lower than the corresponding price or charge specified for comparable work or services, then the lower price or charge is applicable to the corresponding work or services performed for the AEC.

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APPENDIX "D"

DRAFT LETTER FROM COMMISSIONER OLSON TO
MR. RAY FREEMEN, GENERAL ELECTRIC COMPANY

1. The Commission has given careful consideration to Mr. George White's wire of September 19, 1960, to Chairman McCone and to your letter to me of March 3, 1961.

2. As you may know, it is the Commission's policy not to sell by-product material to the public to the extent this material is available from private sources at reasonable prices that will not discourage use or research and development. This policy covers cobalt 60.

3. After reviewing the current cobalt 60 price schedules of private producers the Commission has determined that the following commercial rates, which are somewhat higher than AEC's present prices, are reasonable and should not discourage use or research and development:

Specific Activity (Curies/gram)	List price per curie
1-25	$ 2.00
26-40	3.00
41-55	4.00
56-70	6.00

Quantity Purchased (curies)	Net price per curie
0-5000	List price
5,001-25,000	List price less 15%
25,001-100,000	List price less 30%

You will note that although the General Electric Company's list prices are $1. per curie higher in the 26 curies per gram to 55 curies per gram range, the above discount schedule is the same as GE's.

4. AEC will not sell cobalt 60 to the public to the extent it is available from private sources at prices that do not exceed

those indicated above. When the supply from these sources at these prices is inadequate, AEC will satisfy the remainder of the need at these same prices.

5. The Commission will continue to produce and provide cobalt 60 on a custom order basis up to a specific activity of 30 curies per gram in quantities greater than 100,000 curies at $1 per curie where the customer is prepared to accept the material in a single shipment.

6. A press release announcing the foregoing actions is enclosed for your information.

APPENDIX "E"

INCOMING TELEGRAM

September 19, 1960

LONG LNL. SAN JOSE CALIF
CHAIRMAN JOHN A MCCONE
ATOMIC ENERGY COMMISSION
WASH DC

I VIGOROUSLY URGE COMMISSION RECONSIDERATION OF ITS NEW PRICE SCHEDULE FOR COBALT-60 WHICH WAS ANNOUNCED ON SEPT 9, 1960 AND RESTORATION OF THE PRE SEPT 9, 1960 COBALT-60 PRICE SCHEDULED

THE COMMISSION STAFF HAS REPEATEDLY ENCOURAGED GENERAL ELECTRIC TO UNDERTAKE THE PRODUCTION AND SALE OF COBALT-60 TO PRIVATE INDUSTRY, AND TO SO DO, GENERAL ELECTRIC WAS REQUIRED TO MEET THE PRICE ESTABLISHED BY ITS MAJOR COMPETOR--THE COMMISSION IN RESPONSE THERETO, GENERAL ELECTRIC ENTERED INTO LARGE PRIVATE COMMITMENTS FOR PRODUCTION OF COBALT-60 AT PRICES KEYED TO PRE SEPT 9, 1960 COMMISSION PRICE SCHEDULE AND SUBJECT TO ADJUSTMENTS IN EVENT OF CHANGE IN PUBLISHED COMMISSION SCHEDULES.

GENERAL ELECTRIC IS PRODUCING COBALT-60 IN THE GETR WHICH HAS SUSTAINED SEVERE FINANCIAL LOSSES IN ITS YEAR AND ONE HALF OF OPERATION. THE COMMISSION PRICE SCHEDULE ANNOUNCED ON SEPT 9, 1960 WILL MATERIALLY ADD TO THESE FINANCIAL LOSSES.

I UNDERSTAND THAT THE COMMISSION PRICE POLICY IS BASED ON THE EFFECTIVE COMMERCIAL PRICE LEVEL OR IN ABSENCE OF AVAILABLE COMMERCIAL SOURCES FULL COST RECOVERY TO THE COMMISSION DESPITE ITS POLICY OF ENCOURAGING PRIVATE PRODUCTION OF COBALT-60 AND DESPITE ITS POLICIES OF AVOIDING UNDERCUTTING COMMERCIAL

PRICES THE COMMISSION HAS DRASTICALLY REDUCED ITS PRICES. THE EFFECT OF THIS PRICE REDUCTION IS TO CAUSE GENERAL ELECTRIC TO SUFFER HEAVY FINANCIAL LOSSES UNDER CURRENT COMMITMENTS AND TO PREVENT THE DEVELOPMENT OF NEW COBALT-60 BUSINESS UNLESS GENERAL ELECTRIC MEETS THIS SEVERE COMMISSION PRICE COMPETITION.

FURTHER IT WOULD APPEAR THAT THE RECENT COMMISSION ACTION WOULD DISCOURAGE OTHER ENTRANTS INTO THE BUSINESS AND WOULD FORCLOSE THE DEVELOPMENT OF VIGOROUS COMPETITIVE PRIVATE INDUSTRY IN THIS AREA.

GEORGE WHITE ATOMIC POWER EQUIP DEPT SAN JOSE, CALIF.

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APPENDIX "F"

GENERAL ELECTRIC COMPANY
777 14TH STREET, N. W.,
WASHINGTON 5, D. C.

March 3, 1961

The Honorable Loren K. Olson
United States Atomic Energy Commission
Washington 25, D. C.

Subject: Cobalt 60

Dear Mr. Olson:

In mid-September, Mr. George White wired the Commission reporting the hardship resulting from and urging reconsideration of the September 9, 1960 price announcement.

It is understood that private industry has the capacity, desire, and willingness to serve the needs for cobalt 60 having specific activities greater than 25 curies per gram. It is further understood that there are courses of action which can be and are planned to be taken by the Commission which will prevent the threatened financial losses, and will restore conditions conducive to the healthy development of production and sale of high activity cobalt 60 by private industry.

Prompt action by the Commission is urgently needed and requested in order to prevent severe losses on our existing commitments.

Very truly yours,

/s/ R. C. Freeman

R. C. Freeman

Isotopes 3

MAR 30 1961

Mr. David C. Eberhart, Director
Office of the Federal Register
National Archives & Record Service
Washington 25, D. C.

Dear Mr. Eberhart:

I am attaching, for publication in the Federal Register as an effective amendment, an original and three certified copies of a document entitled:

TITLE 10 - ATOMIC ENERGY

Chapter 1 - Atomic Energy Commission

PART 37 - RADIOISOTOPE RESEARCH SUPPORT PROGRAM

Publication of this document at the earliest possible date will be appreciated. Please inform us of the filing and publication dates of this document by telephoning Code 119, Extension 3446.

Sincerely yours,

Attorney
Office of the General Counsel

Enclosures:
Original and 3 Cert. Cys.

cc: Dr. Dunham, BMI (w/cy of attachment)
Wm. Hughes (NI)(w/cy of attachment)
General Manager (w/cy of attachment)
Legal Files (w/cy of attachment)
Legal Ref. Library (w/cy of attachment)
W. S. McCool, CRS (w/cy of attachment)
OGC Reading File (w/cy of attachment)
OGC Chronological File (w/o attachment)

RECEIVED
MAR 30 1961
FEDERAL REGISTER

OGC OGC

BRYCH:ccl

OGC 398/20

3-30-61

TITLE 10 - ATOMIC ENERGY

Chapter 1 - Atomic Energy Commission

PART 37 - Radioisotope Research Support Program

During the past six years the U. S. Atomic Energy Commission has been supporting the purchase of radioisotopes in research in the life sciences. This assistance has been provided through a program known as the "Radioisotope Research Support Program" and has done much to stimulate interest in the use of radioisotopes as a tool in biomedical research.

The Commission has recently concluded that the need for such subsidized support of radioisotopes has diminished significantly, that the use of radioisotopes in biomedical research has become sufficiently well established and that the original objective of the program has now been essentially achieved. For these reasons the Commission has decided to bring the program to a close and terminate it completely by July 1, 1961.

The amendments set forth below effect the orderly termination of the program in accordance with the Commission's decision. Essentially the termination measures are these: No discount certificates will be issued on or after the date of publication of these amendments in the Federal Register. Holders of discount certificates must make their purchases and assure that shipments are made thereon before July 1, 1961; to the extent this is not done, credits against discount purchases of radioisotopes will not be given. Effective upon the date of publication in the Federal Register, 10 C.F.R. Part 37, is amended in the following respects:

1. The following sentence is added at the end of the present text of section 37.9 "Issuance": "No Discount Certificates will be issued on or after , 1961." (Note: Insert date of publication in the Federal Register.)

2. The following paragraph (e) is added to section 37.12:

"(e) Discount purchases may not be made with respect to radioisotopes not shipped by the supplier or distributor, as the case may be, on or before June 30, 1961."

3. The following paragraph (c) is added to section 37.12:

"No credit shall be requested, and none will be given, with respect to any shipments of radioisotopes after June 30, 1961."

4. The following section 37.13 is added:

"37.13 Expiration of Radioisotope Research Support Program. Discount Certificates will not be issued on or after , 1961, and credits will not be given with respect to any shipments subsequent to June 30, 1961 of radioisotopes ordered on the discount purchase basis provided for in the program set forth in this part." (Insert date of publication in the Federal Register.)

Authority: Sec. 161, 68 Stat. 948; 42 U.S.C. 2201

Issued at Germantown, Md., this 29th day of March 1961.

For the Atomic Energy Commission

/s/ Howard D. Cronmiller
Acting Secretary

Certified to be a true copy of the original

Attorney
Office of the General Counsel

AEC

Newspapers-3

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

PRESS RUN MAR 17 1961 2 P.M.

No. D-59
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, March 17, 1961)

AEC TO TERMINATE RADIOISOTOPES RESEARCH SUPPORT PROGRAM

The U. S. Atomic Energy Commission will end its program of giving discounts on radioisotopes made in its facilities for domestic research in biology, medicine and agriculture, effective July 1, 1961. This is consonant with the Commission's policy of withdrawing from the supply of services or materials as commercial sources establish the ability to assume such responsibilities.

From 1948 through 1955 the AEC applied this discount program to the use of radioisotopes in cancer research and therapy only. In 1955 the program was expanded to include radioisotopes for use in other research areas in the life sciences field. During the past six years the program has achieved a reasonable level of success in introducing and encouraging the use of radioactive tracer technology as a basic research tool in the medical, biological and agricultural sciences.

During the past year about 240 discount certificates were issued to approximately the same number of universities, colleges, hospitals, state and private non-profit research institutions. The research projects of the majority of participants under the program are supported by federal funds; however, a very limited group of smaller institutional users might find the change to be significant. As noted by the Commission, the additional costs to the latter group are offset, in part, by the fact that over the past two years substantially lower prices have been put into effect for several key radioisotopes -- notably carbon-14 and iodine-131.

(more)

AEC 398/20

Cy filed: March 21.

3-17-61

The complications arising from the entry into the market of various industrial and foreign suppliers, as weighed against program advantages, have led to the decision to end the discount program. The Commission will continue, however, to encourage the use of radioisotopes in research through other programs in the most effective ways available to it. For example, the radioisotope equipment grant program fosters the use of isotopes in educational institutions at undergraduate and medical schools. This program, in the life sciences alone, amounts to $1,000,000 annually. In addition, the Commission provides substantial support to research projects, through contracts, at universities and other scientific institutions throughout the country.

- 30 -

31761

Isotopes 3

~~OFFICIAL USE ONLY~~

March 15, 1961

MEMORANDUM TO COMMISSIONER GRAHAM

Subject: AEC 994/7 - SUPPLY OF COBALT-60 BY INDUSTRY

This is to remind you that at Meeting 1713 on March 14, 1961, you said you would discuss with Mr. Tomsure and Mr. Ashmenall the matter of AEC's withdrawal from the production and distribution of cobalt-60.

W. B. McCool
Secretary

cc: General Manager
Asst. Gen. Mgr. for RAID
Director, Isotopes Development

☐ CHAIRMAN ☐ DIV./OFFICE DIRECTOR
☐ GENERAL MANAGER ☐
☐ ASST. GENERAL MANAGER
REMARKS

also discussed w/ Hull & group - updated to RT H 3/20 m.

INFORMATION ADVICE SENT TO

DISPATCHED
U. S. Atomic Energy Commission
Office of the Secretary
MAR 15 1961
AM PM

Also Economic w/ Industry Group

~~OFFICIAL USE ONLY~~

OFFICE ▶	Secretariat	Secretariat				
SURNAME ▶	JCHoyle:arr	AHEwing				
DATE ▶	3/15/61	3/15/61				

Form AEC-318 (Rev 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-2

10-55-61

1713th AEC
Meeting
3-14-61

5. AEC 994/7 - Supply of Cobalt 60 by Industry

The General Manager introduced for Commission consideration AEC 994/7, which requested AEC's withdrawal from the production and distribution of Cobalt 60 available from private industry facilities. Mr. Aebersold reviewed for the Commission AEC's present role in the production of cobalt 60 and the capability of private industry to supply current needs. He noted General Electric and Westinghouse had facilities to produce cobalt 60 in the quantities needed, but both companies had indicated their prices would be approximately one-third higher than current AEC list prices. Atomic Energy of Canada Limited (AECL), he said, had undersold the AEC in the past, and in the light of possible higher prices, AECL might obtain the entire U. S. cobalt 60 market as well as foreign markets.

Mr. Aebersold noted the Commission would continue to produce and provide cobalt 60 in large quantities for use in foods, drugs, and chemicals but the loss in revenue to AEC from discontinuing cobalt 60 production, for applications for which privately produced cobalt 60 was available, would be about $1.0 million. He added a reallocation of approximately $.5 to $.75 million of fixed program costs might cause a unit cost rise of 40 to 60 percent in the remaining 100 radioisotopes distributed by the AEC.

In answer to a question from Mr. Wilson, Mr. Aebersold suggested GE would probably use their quoted list price as a basis for negotiation and actual contract price could be somewhat lower than the list price. He noted the AEC had been corresponding with GE and Westinghouse for two years in connection with industry's assumption of cobalt 60 production and added both companies were aware of AEC's intention to lower the unit price of cobalt 60 in September 1960. He said neither GE nor Westinghouse had informed the AEC of their prices or contractual arrangements prior to the September 1960 action. Mr. Olson referred to GE's telegram* of September 19, 1960, informing AEC of the actual effect AEC's lowering of the price at that time had on contracts to furnish cobalt 60 to the Budd Company since AEC's list prices became applicable if they were lower than the existing GE prices. In answer to a question from Mr. Olson concerning GE's revenue losses caused by the AEC price reduction on September 15, 1960, Mr. Fowler said the loss would be $300,000 in revenues refelcting the difference between GE's price and AEC's lowered price. Mr. Graham suggested, in the absence of a published list price from Westinghouse, AEC would possibly promote a monoply for the General Electric Company if it withdrew from the production of cobalt 60 at this time and noted that GE stood to gain immediately from its contingent order with the Budd Company as its prices become effective. In reply to a question from Mr. Olson, Mr. Fowler said the critical date from which GE projected its losses was March 1, 1961.

The Commission deferred further consideration of AEC 994/7 and Mr. Graham said he would discuss the matter with Mr. Tammaro and Mr. Aebersold.

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
DETERMINATION (CIRCLE NUMBER(S))
1. CLASSIFICATION RETAINED
2. CLASSIFICATION CHANGED TO
3. CONTAINS NO DOE CLASSIFIED INFO
4. COORDINATE WITH
5. CLASSIFICATION CANCELLED
6. CLASSIFIED INFO BRACKETED
7. OTHER (SPECIFY)
1ST REVIEW-DATE:
AUTHORITY
NAME:
2ND REVIEW-DATE:
AUTHORITY
NAME:

CLASSIFICATION CANCELLED
DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY: JOI B. BUCKNER DOE/NV-625

Sentpers-3 Secretariat

MAR 14 1961

Honorable Chet Holifield, Chairman
Joint Committee on Atomic Energy
Congress of the United States

Dear Mr. Holifield:

Due to changes in economic factors and other circumstances necessitating revisions to the regulations governing the operation of the Radioisotope Research Support Program, an evaluation of the program as a whole was directed. This is the program which since 1955 has provided a price reduction of 80% in the purchase of radioisotopes for biological, medical and agricultural research. The findings developed from this study have led to Commission decision that the termination of the program by the close of Fiscal Year 1961 is both appropriate and desirable.

The decision to discontinue the support program was predicated on several key factors. The primary objective of the program, i.e., to introduce and foster the use of radioactive tracers in life sciences research, has in large measure been achieved. Study of the program's growth during the past few years indicates that an indefinite prolongation will achieve negligible success in bringing new institutions into the program. This was a fundamental consideration in making the determination to close out the support program.

An important contributing factor to this decision was the development of a finding in the study that the research projects of the majority of scientific participants in the program are supported with Federal research funds and, undoubtedly, would have little difficulty in obtaining the relatively small additional amount through these same sources for their requirements of radioisotopic materials. Further, the remaining participants consist primarily of large clinical centers and universities to which this financial support is not a major factor. This leaves a very minor group of the small institutional users on whom the impact of the program termination may be somewhat significant.

It is noteworthy, too, that radioactive material in a variety of forms is becoming available from an increasing number of both domestic and foreign sources, so that the AEC no longer occupies its

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former role as "sole source of supply." As the number of commercial concerns entering into this production field increases one may predict AEC withdrawal from this activity in accordance with its established policy to close out programs at such times as industry has established the ability to take over. Further, with the substantial price reductions effected during the past few years in a period of generally rising costs, particularly concerning the most commonly used radioisotopes of Carbon-14 and Iodine-131, it seems apparent that the research subsidy has become progressively smaller as an economic factor governing the usage of these materials.

Finally, but far from least, is the fact that despite termination of this program, the Commission will continue to encourage and foster the use of radioisotopes in research. An extremely important contribution towards furthering the use of radioisotopes, particularly at educational institutions at the undergraduate, medical school, and public health levels, has been the Commission's Equipment Grant program which, in the life sciences alone, amounts to $1 million annually. In addition to the substantial research project support by the Commission, we will continue to exploit and encourage the utilization of radioisotopes as a valuable research tool in the most effective ways available to us.

Attached is a copy of a public announcement concerning the termination of the "Radioisotopes Support Program" which we plan to issue within the very near future.

If the Committee has further questions on this matter or wishes to be supplied with additional information we shall be pleased to provide it.

Sincerely yours,

SIGNED, A. R. LUEDECKE

General Manager

Attachment:
Public Announcement

cc: BMA (1)
OGM (2)
CONG. REL. (3)
OPI (1)
OID (1)
Secretariat (1)

BMA	ADA	BMPC
2/ /61	HAStanwood 2/ /61	JCWhitnah 2/ /61

DIRECTOR	OPI	OID	AGM/RID	AGM	DGM	OGM	CONG. REL.
CLDunham 2/ /61	2/ /61	2/ /61	2/ /61	2/ /61	2/ /61	2/ /61	2/ /61

AEC TO TERMINATE RADIOISOTOPES
DISCOUNT SUPPORT PROGRAM

The U. S. Atomic Energy Commission will end its program of giving discounts on radioisotopes only in the facilities for domestic research in biology, medicine and agriculture, effective July 1, 1961. This is consonant with the Commission's policy of withdrawing from the supply of services or materials on commercial scales wherever the ability to assume such responsibilities.

From 1948 through 1955 the AEC applied this discount program to the use of radioisotopes in cancer research and therapy only. In 1955 the program was expanded to include radioisotopes for use in other research areas in the life sciences field. During the past six years the program has achieved a reasonable level of success in introducing and encouraging the use of radioactive tracer technology as a tool in research in the medical, biological and agricultural sciences.

During the past year about 350 discount certificates were issued to approximately the same number of universities, colleges, hospitals, state and private non-profit research institutions. The research projects of the majority of participants under the program are supported by Federal funds. However, a very limited group of smaller institutions were might find the change to be significant. As noted by the Commission, the additional costs to the latter group are offset, in part, by the fact that over the past two years substantially lower prices have been put into effect for several key radioisotopes -- mainly carbon-14 and iodine-131.

(more)

The complications arising from the entry into the market of various industrial and foreign suppliers, as related system program strategies, have led to the decision to end the Sidewall program. The Commission will continue, however, to encourage the use of radioisotopes in research through other programs in the most effective ways available to it. For example, the radioisotope equipment grant program fosters the use of isotopes in educational institutions at undergraduate and medical schools. This program, in the life sciences alone, amounts to $1,000,000 annually. In addition, the Commission provides substantial support to research projects, through contracts, at universities and other scientific institutions throughout the country.

- 30 -

RECEIVED
U.S. Atomic Energy Commission
Office of the Secretary
MAR 16 1961

Jacques 3

MAR 13 1961

MEMORANDUM FOR CHAIRMAN [redacted]
[redacted]
[redacted]
[redacted]

SUBJECT: PUBLIC ANNOUNCEMENT OF [redacted]
[redacted]

Attached for your information is a public announcement on termination of the Committee's radiological research support program. It is expected that the Joint Committee notification will go forward about Tuesday, March 14. In that case we plan to issue the announcement to the public media on March 16.

This public announcement is submitted for the one attached to the memorandum from this office dated March 1, 1961. It is substantially the same as the one which was part of the staff paper on this subject (AEC 156/2) approved by the Commission on February 14.

(signed) Philippe G. Jacques
for

Dennis Clark, Director
Office of Public Information

Attachment

cc: A. R. Luedecke, General Manager

W. B. McCool, Secretary
R. E. Donovan, OGC
Dr. Dunham, DRMR
(Attn: H. Stapleton)
Dr. Asbernsolt, OID
(Attn: Paul Blaetus)

OPI OPI OPI OPI

F. Tokey:jr W. Hughes P. Jacques D. Clark

AEC TO TERMINATE RADIOISOTOPES
RESEARCH SUPPORT PROGRAM

The U. S. Atomic Energy Commission will end its program of giving discounts on radioisotopes made in its facilities for domestic research in biology, medicine and agriculture, effective July 1, 1961. This is consistent with the Commission's policy of withdrawing from the supply of services or materials as commercial sources establish the ability to assume such responsibilities.

From 1948 through 1955 the AEC applied this discount program to the use of radioisotopes in cancer research and therapy only. In 1955 the program was expanded to include radioisotopes for use in other research areas in the life sciences field. During the past six years the program has achieved a reasonable level of success in introducing and encouraging the use of radioactive tracer technology as a basic research tool in the medical, biological and agricultural sciences.

During the past year about 240 discount certificates were issued to approximately the same number of universities, colleges, hospitals, state and private non-profit research institutions. The research projects of the majority of participants under the program are supported by federal funds; however, a very limited group of smaller institutions were might find the change to be significant. As noted by the commission, the additional costs to the latter group are offset, in part, by the fact that over the past two years substantially lower prices have been put into effect for several key radioisotopes -- notably carbon-14 and iodine-131.

(over)

The complications arising from the entry into the market of various industrial and foreign suppliers, as weighed against program advantages, have led to the decision to end the Element program. The Foundation will continue, however, to encourage the use of radioisotopes in research through other programs in the most effective ways available to it. For example, the radioisotope equipment grant program further the use of isotopes in educational institutions at undergraduate and medical schools. This program, in the life sciences alone, amounts to $1,000,000 annually. In addition, the Foundation provides substantial support to research projects, through contracts, at universities and other scientific institutions throughout the country.

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March 10, 1961

AEC 994/7

COPY NO. 44

ATOMIC ENERGY COMMISSION

SUPPLY OF COBALT-60 BY INDUSTRY

Note by the Secretary

The General Manager has requested that the attached report by the Director of Isotopes Development be circulated for consideration by the Commission at an early date.

W. B. McCool
Secretary

DISTRIBUTION	COPY NO.
Secretary	1
Commissioners	2 - 6,49-50
General Manager	7
Deputy Gen. Mgr.	8
Asst. Gen. Mgr. R&ID	9
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AEC 994/7

3-10-61

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X-Pl B-L-D-Test Reactors

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ATOMIC ENERGY COMMISSION

SUPPLY OF COBALT-60 BY INDUSTRY

Report to the General Manager by the Director of Isotopes Development

THE PROBLEM

1. To consider AEC withdrawal from the production and distribution of cobalt 60 available from private industry facilities.

DISCUSSION

2. Commission policy provides that the AEC will withdraw from supplying materials and services established to be reasonably available from private sources.

3. Both the General Electric Company and the Westinghouse Electric Corp. have informed the Commission (Appendices "A" and "B") that they intend to produce a minimum combined total of 225,000 curies of cobalt 60 annually for radiography, teletherapy and other common commercial applications. This is comparable to current AEC annual sales. The private test reactors can supply current needs almost as readily as the AEC can.

4. General Electric began irradiating cobalt 60 in May, 1959. GETR is currently producing cobalt 60 to fill existing orders for more than 200,000 curies. Present plans call for irradiation of a minimum of 150,000 curies of cobalt 60 per year up to 100 curies per gram specific activity. The GETR potentially can produce up to a maximum of 300,000 curies of cobalt 60 per year without significant flux perturbation.

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5. Westinghouse is now producing cobalt 60 at a planned annual rate of 75,000 curies. The WTR potentially can produce cobalt 60 up to a maximum of 500,000 curies per year.

6. Quantities of cobalt 60 larger than the minimum combined total of 225,000 curies will be produced by General Electric and Westinghouse only to the extent that test reactor space is not utilized for commercial test irradiation services, primarily to minimize reactor operating losses. Neither company currently plans to maintain large inventories of cobalt 60. However, cobalt 60 will normally be kept in the reactor and can be discharged to meet customer needs. The preferred mode of operation would be an irradiation service based on firm orders and customer specifications.

7. Both companies have indicated that they will price cobalt 60 at list prices approximately one-third higher than current AEC list prices (see Appendix "C"). These prices nonetheless are not considered to be unreasonable for the envisioned applications where the cost of the radioisotope source usually is small in comparison with the equipment and installation costs. (Note that Westinghouse has not yet confirmed its pricing plans in writing to AEC.)

8. Atomic Energy of Canada Limited cobalt 60 price schedule is equal to or slightly less than the current AEC price. It is estimated that AECL supplies 60% of the U. S. market. It is possible therefore that AECL because of higher commercial U.S. prices could capture the entire U.S. cobalt 60 market as well as foreign markets heretofore served by U.S. companies.

9. The loss in revenue to AEC from discontinuing cobalt 60 production would not be offset by a corresponding reduction in

costs chargeable to the radioisotope production and distribution program. Therefore, withdrawal from cobalt 60 production and possible withdrawal over the next 18 months from iodine 131 and iridium 192 production as well would result in program costs significantly greater than revenues. Revenues would be reduced by about 1 million dollars or 40% over 1960 sales experience. If these program costs were re-allocated to the remaining approximately 100 radioisotopes distributed and their prices increased accordingly, this could have the effect of retarding research and development uses of radioisotopes.

10. On December 31, 1960, the Oak Ridge National Laboratory had a 500,000 curie cobalt 60 inventory valued at about $435,000. This includes about 130,000 curies of 70 to 90 curie per gram radiography pellets recently discharged from Commission reactors. An additional 150,000 curies of cobalt 60 are currently being irradiated to a specific activity of 50 curies per gram. Most of the current inventory has been committed to commercial and government users, except for the 130,000 curies of high specific activity radiography pellets and the 150,000 curies currently being produced. This would be used to meet cobalt 60 needs which private industry might not be able to provide during the transition from AEC to private production.

11. On September 9, 1960, the Commission announced that to foster development of high intensity process radiation applications it would produce and provide cobalt 60 in quantities greater than 100,000 curies at $1. per curie. Neither the General Electric Company or Westinghouse Corp. are prepared to meet such requirements.

12. The Commission has current commitments to produce approximately 1,400,000 curies of cobalt 60 for the Quartermaster

Corps and approximately 100,000 curies of cobalt 60 for the Bureau of Mines in fiscal year 1962 in accordance with formal agreements between these agencies and the Commission.

13. The following is a feasible plan for eliminating AEC competition with private industry in the production of Cobalt 60:

a. Withdraw from the production and distribution of cobalt 60 that is reasonably available from domestic sources of supply independent of the Commission.

b. Deplete the current cobalt 60 inventory at Oak Ridge National Laboratory through sales as per "c" below and use in AEC and other government agency research irradiators; however, until the General Electric Company and Westinghouse programs are fully operational and demonstrated to be adequate, maintain minimum inventories largely derived from current stocks to meet firm orders for Cobalt 60 not available from these companies.

c. Except as noted below, consider providing cobalt 60 in the type and quantity employed in radiography, teletherapy and other common commercial applications only when it is demonstrated by the purchaser that availability of such material from private sources is not reasonably adequate.

d. Provide, except as noted below, cobalt-60 at the same prices as the present lowest private price schedule, but only to the extent that domestic commercial sources are not marketing sufficient amounts at these prices.

e. Note that the Commission would continue to produce and provide cobalt 60 on a custom order basis up to a specific activity of 30 curies per gram in quantities greater than 100,000 curies at $1. per curie where the customer is prepared to accept the material in a single shipment. (The intended effect of the 30 curie per gram limitation is to preclude use of AEC produced cobalt 60 for applications for which privately produced cobalt 60 is available.)

f. Note that the Commission would produce approximately 1,400,000 curies of cobalt 60 for the Army Quartermaster Corps and 100,000 curies of cobalt 60 for the Bureau of Mines in accordance with formal agreement with these agencies.

CONCLUSIONS

14. Private industry facilities are capable of providing cobalt 60 in quantities comparable to AEC annual sales of this isotope for radiography, teletherapy and other common commercial applications. Prices to be charged for cobalt 60 by these

private companies do not appear to be unreasonable for these applications, although higher than current AEC and AECL prices. In accordance with existing Commission policy therefore, the AEC should withdraw from the production and distribution of cobalt 60 to the extent it is available from private industry facilities.

STAFF JUDGMENTS

15. The Division of Finance concurs in the recommendations of this paper. The Office of the General Counsel has no legal objection. The attached public announcement has the concurrence of the Office of Public Information.

RECOMMENDATION

16. The General Manager recommends that the Atomic Energy Commission:

a. Approve AEC withdrawal from the production and distribution of cobalt 60 to the extent it is available from private facilities in accordance with the plan set forth in paragraph 13 above;

b. Note that the references to AEC withdrawal when materials and services are reasonably available from private sources means also that the prices are not unreasonable;

c. Note that the AEC will retain the option of producing cobalt 60 to meet its own requirements;

d. Note that the Joint Committee on Atomic Energy will be notified of this action by appropriate letter;

e. Note that a public announcement similar to that attached as Appendix "D" will be issued;

f. Note that this paper is unclassified.

LIST OF ENCLOSURES

	Page No.
APPENDIX "A" - Letters from the General Electric Co.	6
APPENDIX "B" - Letter from the Westinghouse Electric Corp.	10
APPENDIX "C" - Comparative price schedules for cobalt 60.	11
APPENDIX "D" - Draft Press release	12

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APPENDIX "A"

GENERAL ELECTRIC COMPANY

November 22, 1960

Mr. Eugene Fowler
Deputy Director
Office of Isotopes Development
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Fowler:

Confirming our discussions at Germantown on November 10, 1960, we are pleased to restate our position and policy for participation in the Cobalt-60 market.

Subsequent to our first meeting on September 29, 1960, we took into consideration the various factors affecting a production estimate for Cobalt-60 production in the GETR. These factors include availability of space, neutron flux levels, existing commitments, market forecasts, operating efficiency and other technical considerations. It is our conclusion, after a thorough review of these factors, that the General Electric Company is capable of producing a minimum of 150,000 curies per year of Cobalt-60 of a specific activity of from 25 curies per gram up to approximately 100 curies per gram. This production estimate is, of course, contingent upon a realistic operating efficiency of approximately 65% and does not take into consideration the remote possibility of a prolonged reactor outage which would substantially reduce this 65% on-stream factor.

As discussed in our meeting, we presently have a substantial quantity of stock uncommitted Cobalt-60 on hand in the reactor and we believe that this stock would enable us to commence production at the 150,000 curies rate upon receipt of orders from customers. Although we are currently producing Cobalt to fill existing orders in excess of 200,000 curies, we are sufficiently far along with the existing work that the new work referred to above could be undertaken upon receipt of orders. With respect to pricing, it has been our policy in the past to meet AEC prices where possible and our existing orders have been secured on this basis. Our current price policy is to quote only on material with a specific activity greater than 25 curies per gram and at the following price rates per curie and quantity discounts:

Specific Activity	List Price per Curie	
25 to 40 curies/gram	$4.00/curie	
Greater than 40 curies/gram	$5.00/curie	minimum with prices for high specific activity estimated on the basis of individual customer requirements.

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Discounts

0 to 5,000 curies	List Price
5,001 to 25,000 curies	List Price less 15%
25,001 to 100,000 curies	List Price less 30%
Greater than 100,000 curies	List Price less 35%

The above prices do not include use of casks or transportation charges, but do include procurement, encapsulation, irradiation and calibration of Cobalt.

These prices are, of course, the AEC prices which existed prior to September 15, 1960, and in our opinion represent a minimum price level for reasonable participation in the business especially in view of the fact that we utilize a test reactor for production of Cobalt-60.

We trust that the information we have presented is sufficiently complete to enable the Commission to render a decision on its participation in the Cobalt-60 market. Our proposal for our own participation in this market is based on a considerable amount of accumulated experience in operating the GETR on a full-power basis since May of 1959 and, in addition, producing Cobalt from that time. We believe we are well equipped and qualified to continue in the Cobalt business, and it is our hope that the Commission will be satisfied that our capacity, along with that of others in private industry, is sufficient to meet all future requirements for the production of Cobalt-60.

Very truly yours,

R. L. Schmidt
Manager
Government, Research & Development
Applications

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GENERAL ELECTRIC COMPANY

December 5, 1960

Mr. E. Eugene Fowler, Deputy Director
Office of Isotopes Development
United States Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Fowler:

This letter supplements Mr. R. L. Schmidt's letter to you of November 22, 1960 regarding General Electric's position and policy for participation in and production capacity available to serve the market for cobalt 60.

Representative of our uncommitted stock of cobalt 60 suitable for radiography and teletherapy are the following items:

Quantity in Curies	Size	Specific Activity
22,000	1 cm x 2 mm	25-55
22,000	1 cm x 2 mm	Above 55
10,000	1 cm x 5 mm	25-55

The last sentence of the November 22 letter should be qualified by adding these words to that sentence: "....having a specific activity greater than 25 curies per gram".

Very truly yours,

R. C. Freeman

Appendix "A"

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GENERAL ELECTRIC COMPANY

March 1, 1961

Mr. E. Eugene Fowler
Office of Isotopes Development
United States Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Fowler:

The following information amplifies and supplements General Electric's standard prices for cobalt 60 as given by Mr. R. L. Schmidt's letter of November 22, 1960:

Specific Activity Curies Per Gram	List Price Per Gram
25-40	$4.00
41-60	$5.00
61-80	$6.00
81-100	$6.75

Prices for activities greater than 100 curies per gram will be furnished on request.

The discount schedule is the same as given in the November 22 letter.

You will note that this does not change any of the prices given by the November 22 letter but does fill in standard prices for some of the higher activities.

In reply to the inquiry of the second paragraph of your letter of February 8, 1961 we report that to date we have received but one order for 1/16" x 1/16" pellets in the range of 80-100 curies per gram specific activity. This order was booked prior to September, 1960 at a price of $6.75 per curie less a 15% discount for a quantity ordered in excess of 5,000 curies. This price and discount was established on a basis consistent with AEC prices in effect at that time which we believe did not distinguish between pellets and wafers. We are now conducting a value-analysis study of pellets as compared to wafers. Upon conclusion of this study, we will review the pellet price structure to see if lower prices are feasible.

The above information was given to Mr. Machurek by telephone on March 1.

Very truly yours,

/s/

R. C. Freeman

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APPENDIX "B"

WESTINGHOUSE ELECTRIC CORPORATION

January 6, 1961

Mr. E. Eugene Fowler
Deputy Director
Office of Isotopes Development
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Fowler:

We have had previous correspondence regarding the WTR's intention on the production of cobalt-60.

In response to your request, we have made a thorough review of our cobalt production capability.

The present market price for cobalt does not encourage production at the expense of other experimental programs. Nevertheless, WTR uses cobalt-60 as a portion and we have a capability which will vary with the amount of our experiment loading.

It is our intention to produce a minimum of 75,000 curies of cobalt-60 a year at specific activities between 30-40 curies/gm in two sizes. We are currently using 1 cm x 1 mm thick, and contemplate using 2 cm x 1 mm thick in the immediate future. We would, therefore, expect to furnish this cobalt in the 20-40 curie/gram range between now and October 1, 1961. We will bid on furnishing other sizes and activities on an individual order basis and produce it upon the receipt of a purchase order.

I hope that this information will assist you in determining the capability of private industry to furnish cobalt-60. If for any reason, you require further information, I would be glad to discuss this with you in greater detail.

Sincerely yours,

R. J. McDevitt, Manager
Contract Administration
and Project Engineering

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APPENDIX "C"

COBALT 60 PRICE LISTS

AEC
(Effective 9/15/60)

Specific Activity (c/g)	Price/c
1 - 25	$2.00
26 - 40	$3.00
Greater than 40 but less than 55	$4.00
55 & above	Not established yet

Discount Schedule

Quantity Ordered (curies)	Net price/curie
0 - 5,000	List price
5,001 - 25,000	List price less 25%
25,001 - 100,000	List price less 50%
Greater than 100,000	All material for $1.00/c

GE
(Effective 3/1/61)

Specific Activity (c/g)	Price/c
25 - 40	$4.00
41 - 60	$5.00
61 - 80	$6.00
81 - 100	Price on request

Discount Schedule

Quantity Ordered (curies)	Net price/curie
0 - 5,000	List price
5,001 - 25,000	List price less 15%
25,001 - 100,000	List price less 30%
Greater than 100,000	List price less 35%

AECL

Specific Activity (c/g)	Price/c
0 - 10*	$1.50
10 - 25)**	$2.00
26 - 40)	$3.00
41 - 55)	$4.00
56 - 70)	$4.20
71 - 85)	$4.40
86 - 100)	$4.65
101 - 115)	$4.85
116 - 130)***	$5.05
131 - 145)	$5.25
146 - 160)	$5.50
161 - 175)	$5.85
176 - 190)	$6.26
191 - 205)	$6.65

Discount Schedule

Quantity Ordered (curies)	Net price/curie
0 - 5,000*	List price
5,001 - 25,000	List price less 25%
25,001 - 50,000	List price less 40%
Prices for larger quantities on request	
0 - 5,000**	List price
5,001 - 25,000	List price less 25%
25,001 - 100,000	List price less 50%
Prices for larger quantities on request	
0 - 10,000***	List price
10,001 - 25,000	List price less 25%
25,001 - 50,000	List price less 35%
Prices for larger quantities on request	

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APPENDIX "D"

AEC WITHDRAWS FROM ROUTINE PRODUCTION OF COBALT-60

1. The Atomic Energy Commission is withdrawing from the routine production and distribution of cobalt-60, effective immediately. This is in accordance with the Commission's general policy to discontinue providing material or services which are reasonably available from commercial sources.

2. Cobalt-60, in quantities sufficient to meet ordinary demands, in now being produced in the test reactors of the Westinghouse Electric Corp. and General Electric Company for radiography, teletherapy and other common applications.

To encourage development of ionizing radiation as a major processing tool, the AEC will continue to provide cobalt-60 (up to a specific activity of 30 curies per gram) in quantities greater than 100,000 curies. This will be done on a custom order basis where the customer is prepared to accept the material in a single shipment. This material is priced at $1 per curie. The price schedule for other than 100,000 curie quantities of cobalt-60, established September 9, 1960, is no longer in effect for cobalt-60 supplied from AEC facilities.

4. The AEC will consider providing cobalt-60 of the type and in the quantity employed in radiography, teletherapy and other commercial applications only when it is demonstrated by the purchaser that the supply of such material from private sources is not reasonably adequate. Under these circumstances the cobalt-60 will be priced at the AEC full cost, or at reasonable private rates, whichever are higher. On this basis, the AEC charges are:

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Specific Activity (curies per gram)	List Price per Curie
1-25	$ 2.00
26-40	3.00
41-55	4.00
56-70	6.00

Discounts

0-5000 curies	List Price
5001-25,000 curies	List Price less 15%
25,001-100,000 curies	List Price less 30%

The above list does not include handling or service charges.

5. These prices are substantially the same as those announced on September 9, 1960, except that the discounts on larger purchases are lower -- list price less 15% rather than 25% on 5,001 to 25,000 curies, and list price less 30% rather than 50% on 25,001 to 100,000 curies.

6. Major encapsulators of cobalt-60 sources greater than 100 curies are listed below.

LARGE COBALT-60 SOURCE (OVER 100 CURIES) COMMERCIAL ENCAPSULTATIONS IN THE UNITED STATES

Admiral Corporation
3800 Cortland Street
Chicago 47, Illinois

The Budd Company
Instruments Division
Box 245
Phoenixville, Pennsylvania

Gamma Industries, Inc.
P. O. Box 2543
2255 Ted Dunham
Baton Rouge, Louisiana

General Electric Company
Atomic Products Division
Atomic Power Equipment Department
2151 South First Street
San Jose 12, California

Isotopes Specialties Company
Division of U.S. Nuclear Corp.
P. O. Box 688
170 West Providencia
Burbank, California

Nuclear Research Corporation
Southampton, Pennsylvania

Nucledyne Division
Cook Electric Company
3412 River Road
Franklin Park, Illinois

Picker X-Ray Corporation
Waite Manufacturing Division, Inc.
17325 Euclid Avenue
Cleveland 12, Ohio

U.S. Nuclear Corporation
P. O. Box 208
801 N. Lake Street
Burbank, California

Westinghouse Electric Corporation
Testing Reactor
P. O. Box 1075
Pittsburgh 30, Pennsylvania

Large Encapsulated Cesium 137
Sources Available From:
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, Tennessee

OPTIONAL FORM NO. 10
5010-104

Supply-3 ~~OFFICIAL USE ONLY~~ Reference Sec

UNITED STATES GOVERNMENT

Memorandum

TO : Charles L. Dunham, Director
Division of Biology and Medicine

DATE: February 16, 1961

FROM : W. B. McCool, Secretary

SUBJECT: AEC 398/20 - DISCONTINUANCE OF THE RADIOISOTOPES RESEARCH SUPPORT PROGRAM

SYMBOL: SECY:WLW

1. We informed your office on February 15, 1961, that at Meeting 1701 on February 14 the Commission:

a. Approved the phasing out of the Radioisotopes Research Support Program and complete termination effective July 1, 1961;

b. Noted that the recommendation in a above is contrary to the views of the ACBM as set forth in paragraph 4 of AEC 398/20;

c. Noted that a letter to the Joint Committee on Atomic Energy similar to Appendix "C" to AEC 398/20 will be sent;

d. Noted that a public announcement similar to that included herein as Appendix "D" to AEC 398/20 will be issued;

e. Noted that an amendment rescinding the provisions of Part 37, Title 10 of the Federal Regulations will be published in the Federal Register; and

f. Noted that AEC 398/20 is unclassified.

2. You will recall that the Commission also requested that no new licensees be added to the program during the phase out period to July 1, 1961.

3. The General Manager has directed you to take the action required by the above decision. It is our understanding that your office will prepare the correspondence to the JCAE. A copy of this letter together with other pertinent correspondence should be provided the Office of the Secretary.

cc: General Manager
Deputy General Manager
Asst. General Manager
Asst. Gen. Mgr. for Adm.
Asst. Gen. Mgr. for R&ID
General Counsel
Controller
Director, Isotopes Development
Director, Public Information
Congressional Relations

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2-16-61

Isotopes - 3

1701 AEC
Meeting
2/14/61

4. AEC 398/20 - Discontinuance of the Radioisotopes Research Support Program.

The General Manager introduced the proposed termination of the Radioisotopes Research Support Program. Since July 1955 the cost of radioisotopes procured from AEC sources was supported to the extent of 80 percent of the AEC established prices for biomedical and agricultural research. General Luedecke said the staff recommended termination of the program. Dr. Dunham believed cancellation of the program was a timely termination of a subsidy to private enterprise. He said the principle users of radioisotopes were large institutions, and the cost of radioisotopes was a relatively minor part of their research budgets. Mr. Wilson asked if a termination date of July 1, 1961, would provide current users with adequate time to budget for the elimination of the AEC subsidy. Mr. Seaborg was concerned about the affect the termination of this subsidy would have on research now supported by subsidy to small colleges, and also about the reaction of the academic community to the termination of this program. He said termination might convey the impression Government is no longer interested in supporting research programs in educational institutions. Commissioner Wilson said the AEC should develop new isotopes rather than involve itself in a subsidy system. He did not believe there would be any serious adverse reaction as a result of discontinuance of the radioisotopes research support program.

Mr. Aebersold commented the Radioisotopes Support Program had been successful, but the Program should be termin ated since it had accomplished its objectives.

The Commission requested that no additional licensees be included in the phase-out period of the Radioisotopes Research Support Program.

After further discussion, the Commission:

a. Approved the phasing out of the Radioisotopes Research Support Program and complete termination effective July 1, 1961;

b. Noted that the recommendation in a above is contrary to the views of the ACBM as set forth in paragraph 4 of AEC 398/20;

c. Noted that a letter to the Joint Committee on Atomic Energy similar to Appendix "C" to AEC 398/20 will be sent;

d. Noted that a public announcement similar to that included herein as Appendix "D" to AEC 398/20 will be issued;

e. Noted that an amendment rescinding the provisions of Part 37, Title 10 of the Federal Regulations will be published in the Federal Register; and

f. Noted that AEC 398/20 is unclassified.

CONFIRMED TO BE UNCLASSIFIED
DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY: JOI S. BUCKNER DOE/NN-523

2/14-61

Isotopes - 3

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AEC 398/20

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January 28, 1961

AEC 398/20

COPY NO. 45

ATOMIC ENERGY COMMISSION

DISCONTINUANCE OF THE RADIOISOTOPES RESEARCH SUPPORT PROGRAM

Note by the Secretary

The General Manager has requested that the attached report by the Director of Biology and Medicine be circulated for consideration by the Commission at an early date.

W. B. McCool
Secretary

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ATOMIC ENERGY COMMISSION

PROPOSED DISCONTINUANCE OF THE RADIOISOTOPES RESEARCH SUPPORT PROGRAM

Report to the General Manager by the Director of the Division of Biology and Medicine

THE PROBLEM

1. To consider the termination of the "Radioisotopes Research Support Program" wherein the cost of radioisotopes procured from AEC sources is being supported to the extent of 80% of the AEC established prices, for biomedical and agricultural research.

SUMMARY

2. Since July 1955 the Atomic Energy Commission has been supporting the purchase from AEC sources of radioisotopes for research purposes in the life sciences, including research in diagnosis and in therapy. The program was inaugurated in 1955 on the basis of a recommendation by The Joint Committee on Atomic Energy as an expansion of an earlier program for support of cancer research and therapy, started in 1948. The underlying reasons for implementing the current program were to stimulate interest in and encourage the use of radioisotopes as a basic tool in biological research.

3. As a result of a review of the current status of the program it has been determined that maximum accomplishment has been essentially achieved and that a phase-out leading to termination of the program appears to be in order. The number of scientific researchers utilizing radioisotopes under the support program has been at a stable level for over a two-year period, with little indication that continuance of the program will attract a greatly expanded number of users. Further, a study reveals that a high percentage of researchers under the program (or approximately 68%)

are presently supported with AEC or other government agency funds and would have little or no difficulty obtaining additional funds for the cost of radioisotopes should this program not exist. In addition, it is to be noted that the selling price of radioisotopes has been substantially reduced during the past few years, particularly in the case of radioisotopes most in demand, e.g. Carbon-14 which has been reduced from $28.00 to $9.50 per mc. Further, the average participating institution realizes something less than $1,000 per year in discount credit and such cost of radioisotopes is relatively insignificant when compared with the total cost of the research program. Present regulations confine the support program to radioactive material produced in AEC facilities. This restriction tends to retard the production of radioisotopes in private reactors in use by industrial and educational groups. Finally, with the advent of an increasing number of domestic and foreign producers and suppliers other than AEC facilities, the problems of administering the program become exceedingly more complex. Thus, there is considerable reason to believe that, aside from the good will and excellent public relations the program has created, there is insufficient real benefit to the participating researchers to warrant the continuation of support at an estimated annual cost of $300,000 to the Commission.

4. The Advisory Committee for Biology and Medicine has reviewed the radioisotopes support program and the views of the Committee were included in the Committee Chairman's letter of December 28, 1960 to the Commission Chairman. Quoted in pertinent part is the concensus of the Committee.

> "On two occasions we have reviewed with the staff of the Division of Biology and Medicine the Radioisotope Research Support Program. For several years the Commission has granted a subsidy of 80% of the cost of isotopes used in biomedical research. Although the program is of small cost, it is increasingly difficult to administer. Notwithstanding the difficulties, the Committee is strongly of the opinion that here is an instance where the Commission has gained much credit in the public mind and that it would be undesirable to discontinue this general assistance to biomedical research."

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It is to be noted that the Division of Biology and Medicine has given serious consideration to the valued expressions of the Advisory Committee for Biology and Medicine, but has nevertheless concluded, because of the reasons given in this paper, that termination of the program as recommended is the preferred course of action.

STAFF JUDGMENT

5. The Division of Finance, the Office of Isotopes Development and the Office of General Counsel concur in the recommendation of this paper. The Office of Public Information concurs in the public announcement included herein as Appendix "D".

CONCLUSION

6. In recognition of the decreasing need by scientists for this special subsidy support in obtaining radioisotopes, of the fact that the use of radioisotopes in biomedical research is now considered routine and therefore such utilization needs no longer to be promoted or encouraged by such special subsidy and of the availability of radioisotopes from an increasing number of sources, at price levels which are constantly being reduced, it is concluded that it is timely to phase out the Radioisotopes Research Support Program with a target for complete termination by July 1, 1961.

RECOMMENDATION

7. The general Manager recommends that the Atomic Energy Commission:

a. Approve the phasing out of the Radioisotopes Research Support Program and complete termination effective July 1, 1961.

b. Note that the recommendation in a. is contrary to the views of the ACBM as set forth in paragraph 4 above;

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c. Note that a letter to the Joint Committee on Atomic Energy similar to Appendix "C" will be sent;

d. Note that a public announcement similar to that included herein as Appendix "D" will be issued;

e. Note that an amendment rescinding the provisions of Part 37, Title 10 of the Federal Regulations will be published in the Federal Register;

f. Note that this paper is unclassified.

LIST OF ENCLOSURES

		PAGE NO.
APPENDIX "A"	- Background and Discussion	5
APPENDIX "B"	- Letter, August 16, 1954, Chairman, JCAE to Chairman, AEC	19
APPENDIX "C"	- Proposed Letter to the Joint Committee on Atomic Energy	23
APPENDIX "D"	- Proposed press announcement on Termination of the Radioisotopes Research Support Program	25

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APPENDIX "A"

BACKGROUND

1. Present Policy. The present Radioisotope Research Support Program is an outgrowth of an earlier assistance program of the Commission under which radioisotopes were furnished to investigators at first free of charge and later at 20% of list price. This applied to cancer therapy and research in approved institutions. This program commenced in 1948 and was phased out in 1955. In a letter dated August 16, 1954 from the Chairman of the Joint Committee on Atomic Energy to the Chairman of the Atomic Energy Commission (Appendix "B") it was recommended that the policy of subsidizing isotopes for cancer research be broadened to include "all bonafide medical research." At this point the present program for biomedical research support was inaugurated. At Meeting 1065 on March 14, 1955, after consideration of AEC 398/12, the Commission approved the policy of supporting 80% of the cost of radioisotopes for all approved biomedical and agricultural research uses, to be effective July 1, 1955, and noted that funding requirements would be budgeted by the Division of Biology and Medicine. Over-all responsibility for administering the program was also delegated to the Division of Biology and Medicine.

2. The Commission's decision formalized by the publication of Part 37 of Title 10 of the Federal Regulations on July 2, 1955. This part provided that the authority, scope, limitations and requirements of the Radioisotopes Research Support Program be implemented by the Division of Biology and Medicine.

3. AEC 398/12 noted that support of research using radioisotopes in the physical sciences was on a much more limited

scale than in the biological sciences, and that such support would continue to be provided by the Division of Research through its off-site research contract program. All radioactive material under the current support program has been reactor produced. Cyclotron produced isotopes were excluded from the Radioisotopes Research Support Program.

4. History of Problems. During the five year life of the Radioisotopes Research Program (July 1955 thru June 1960) the direct cost to the AEC for the 80% discount of the radioactive material purchased has been $1,249,512 or an annual average cost of $249,902. The following tabulations provide a further indication of the growth trend of the program during this period:

Actual Discount Cost to Division of Biology and Medicine

	FY-1956	FY-1957	FY-1958	FY-1959	FY-1960
Oak Ridge National Laboratory	$215,601	$207,851	$233,820	$279,611	$220,935
Brookhaven National Laboratory	4,000	10,812	19,649	24,050	33,183
Total	$219,601	$218,663	$253,469	$303,661	$254,118
Percent of Change Over Previous Year	0	0	+ 16%	+ 20%	- 20%

Discount Certificates Issued by DBM

	FY-1956	FY-1957	FY-1958	FY-1959	FY-1960
Number	226	229	229	233	253

As demonstrated above the participation growth of the program has not been dramatic; however the above data indicate a stable situation with respect to number of participating institutions accompanied by a modest annual increase in total value of radioisotopes provided. The monetary decline in FY-1960 can be ascribed primarily to price reductions during that period.

5. Original impetus to the program was generated by advising all institutions participating in the former cancer program of the availability of the newly expanded program for isotope assistance in the broader field of biomedical research. Further, the existence of this program has been given wide publicity by commercial suppliers and in the scientific journals. The following remarks relate to various aspects of the program and problem areas that have arisen during the past five years.

A. EXTENT OF THE DISCOUNT PRIVILEGE

6. It was determined originally that the discount privilege would be confined to domestic institutions or individuals engaged in research in the life sciences including state, municipal and private organizations. Foreign institutions and Federal Agencies of the U. S. Government were expressly excluded by the Federal Regulation.

7. Foreign participation was referenced in AEC 398/12, but it was determined such research assistance, when authorized would be administered more appropriately under specific agreements with the foreign nations. During the past five years, twenty three requests from foreign investigators have been received, and replies to each were made explaining the limitation to U. S, participation.

8. Part 37 of Title 10 further provides that the discount pertains to the value of the radioisotopes, and as such, a literal interpretation has been applied to this provision. This precludes application of the discount to the cost of compounds and synthesizing services. Also excluded are radioactive material used in fixed sources and service irradiation charges.

9. Several years ago it was proposed that the total amounts of all radioactive material used in the synthesis of various compounds (particularly carbon ^{14} compounds) be subject to the discount. Opinion on the impact of such a proposal was solicited from 30 secondary suppliers. Twelve replies were received representing those firms responsible for the larger share of the total production. The responses ranged from complete agreement to outright refusal to participate in such arrangement. It was concluded that such an attempt on the part of the AEC to give a research institution the advantage of the discount on the original value of radiocarbon and other isotopes prior to the synthesis, rather than restrict it to the activity contained in the finished product, could not be accomplished in a practical manner. Problems created by such an arrangement involved title to the residual materials, rates of yield among the various competing suppliers, conversion and disposal of intermediate and waste materials, shipping costs and safety hazards in transferring residual materials to those users who elected to retain title to this material, etc.

10. Effective June 1, 1959, the price of carbon^{14} was reduced by Oak Ridge National Laboratory from $28.00 a millicurie to $13.00 and then to $9.50 effective July 1, 1960. This action has served to diminish the need for further study of the problem relative to organic compounds. At the present time approximately one-half of the total dollar value of the support program is for carbon^{14}. The versatility and importance of carbon in all organic compounds makes this radioisotope very useful in metabolic studies and many other biomedical and physiological investigations. The above referenced price reductions were of considerable assistance to research organizations working with limited budgets, since it had the effect of reducing the cost to the investigator from $5.60

per millicurie to $1.90 after discount. Just recently we have been advised that a commercial supplier of radioisotopes is offering privately produced iodine^{131} for sale, at published sales prices ranging from 30 to 55 cents per millicurie (depending on quantity shipped) including handling charges. These prices compare very favorably with the established AEC price of 30 or 40 cents per millicurie (depending on quantity shipped) plus a $20.00 handling charge, which averages about .20 per mc (average shipment being about 100 mc). This has the effect of increasing the unit price per millicurie for the average shipment to 50-60 cents per millicurie.

11. Sale of such privately produced material to discount users is creating problems under the existing regulation which now excludes such material from application of the 80% research discount. If a supplier grants a research discount to a user on some privately produced radioisotopes, he is not entitled to claim credit for this discount from the AEC producer; apparently some suppliers have not understood this point clearly. Special attention is given to iodine^{131} since it is the most widely used isotope in clinical research and is second only to carbon^{14} in total dollar volume cost to the support program.

B. CURRENT ADMINISTRATIVE PROCEDURES

12. The administration of the program has been limited to use of only two basic documents - Form AEC 372 "Application for Radioisotope Research Support" and Form AEC-382 "Discount Certificate." In order to expedite response to discount renewal requests and supplemental requests for new projects during the year, two form letters have been designed to meet this need. The executed application form is supplied by the applicant to DBM in an original only. If the request is approved, five copies of the Discount Certificate are prepared. Three copies are mailed to

the institution, one copy is mailed to the Oak Ridge National Laboratory and one copy is retained by DBM for the permanent file. Due to annual funding considerations a renewal procedure is required each fiscal year.

13. At the present time there are 240 active discount certificates issued to universities, colleges, research hospitals, state and private non-profit research institutions and several non-profit research components of profit organizations. Between a thousand and twelve hundred active research projects are normally covered under the authority of the above referenced 240 discount certificates. These projects include both clinical and non-clinical investigations in the medical field; biophysical and biochemical research including in vivo and in vitro studies in the field of biology; and agricultural research in areas of plant nutrition, insecticide, fungicide and fertilizer development work.

C. ADMINISTRATIVE WORK LOADS

14. Research Users Administrative Burden. Every effort has been made to administer the program with a minimum of paperwork. This fact has been favorably commented upon on several occasions. The following is such a quote, "We have been impressed with the speed and courtesy with which our dealings with the Commission have been handled and the continued awareness of the Commission of the desirability of keeping paper work at a minimum" - George L. McNew, Boyce Thompson Institute for Plant Research, Inc.

15. AEC and Contractor Administrative Burden. In addition to the cost of the discounts cited above there is also approximately one man-year's effort expended by the Division of Biology and Medicine in administering the program. This effort has been composed of approximately 1/2 man-year for staff review and 1/2 man-year for clerical and secretarial assistance.

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16. The Isotopes Sales Department of the Oak Ridge National Laboratory has informally estimated that approximately one man month's effort per year is expended in the support program. Some small additional cost for form letters, etc. is also incurred at that location. The costs at the Brookhaven National Laboratory as a result of the Support Program would be negligible since their participation has been very limited, aggregating only $91,694 of discounts during the past five years.

17. Secondary Supplier's Administrative Burden. Secondary suppliers, i.e., private companies engaged in the fabrication of radioactive materials, have been most cooperative in assisting in their phase of the program with one or two exceptions. The role played by these suppliers is one of providing the discount holders with radioactive material in chemical forms not available at AEC facilities. Credits are allowed the discount certificate holders by these firms and subsequently the supplier is credited with the value of these research discounts in his account with the appropriate AEC producer. Complaints, both verbal and written, have been offered by several suppliers regarding the administrative burden entailed by their cooperation in the program for which they receive no tangible compensation. It is reasonable to assume that additional dissatisfaction with various phases of the support program exists throughout the industry. However, some suppliers are reluctant to go on official record as advocating discontinuance of an AEC sponsored program. The competitive nature of the industry today serves to compel suppliers to offer the discount service to certificate holders, despite the administrative burden increase.

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D. RELATIVE IMPACT OF THE PROGRAM ON RESEARCH SUPPORT

18. A recent examination of the discount certificate holder's files on a random sample basis has been conducted, such sample constituting 12% of the total. This analysis indicated that of all the institutions included in the sample, 68% of the research projects being assisted through the Radioisotope Research Support Program were also receiving full or partial support through government research contracts or grants. The 68% figure is composed of 12% supported by the AEC, and 56% supported by all other Federal Agencies. The significant fact here is that a majority of the research projects receiving radioisotope assistance at the rate of 80% of AEC list prices, could have their radioisotope cost supported in full through their research contract or grant.

19. A summary of the results of this random sample (26 institutions) are tabulated below:

Institutions	Number of Projects	Research Supported By		
		AEC	Other Federal	Other
1. Large Universities	84	12	52	20
2. Other Univ. & Colleges	7	-	5	2
3. Small Colleges	39	-	30	9
4. Hospitals	*44	11	13	20
5. Private Research Institutes	8	-	2	6
6. State Clinics & Institutions	4	-	4	-
7. Profit Organizations	3	-	-	3
Totals	189	23	106	60

*Includes University Hospitals

Note: Further analysis of the sample indicates its composition and relative weights of the seven sub-groups shown above to be in excellent conformity with the total group.

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Based on the foregoing sample the following tabulation provides a further description of a composite or typical discount certificate holder's level and type of participation in the program.

"Average" Discount Certificate Holder

(1) Total number of Research Projects in Progress.....7*

*(Composed of 3 Medical, 3 Biological & 1 Agricultural Project)

(2) Projects involving human use.....2

(3) Projects supported by the AEC.....1

(4) Projects supported by other Federal Agencies.....4

(5) Projects supported by other than Federal Agencies.....2

(Total Items 3, 4, and 5, equals Item 1)

(6) Investigators associated with discount supported projects (at the average institution).....13**

**Composed of 7 Medical, 5 Biological & 1 Agricultural

Projected Total Participation

If the foregoing averages are projected on a linear basis the resultant totals for all discount certificates in use at the time of the sample would be as follows:

(1) Total Research Projects receiving Radioisotope Discount Support.....1,805

Breakdown:	Medical	708
	Biological	928
	Agricultural	169

(2) Projects Involving Human Applications..... 464

(3) Breakdown of sources of direct support of the other costs of the 1,805 research projects shown above are as follows:

a. Other Federal Agencies.....1,011
b. AEC..... 216
c. Other Sources..... 578

(4) Total number of Professionals associated with the projects.....3,263

Breakdown:	Medical	1,785
	Biological	1,214
	Agricultural	264

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Although the foregoing totals are approximations rather than precise consolidations they do represent fair estimates of the complexion and magnitude of the program's coverage.

E. POSSIBLE FUTURE OF THE PROGRAM

20. When the present support program was in its planning stages six years ago, it was recognized that radioisotopes would some day be produced by facilities other than AEC's. It was contemplated at that time that the participation of private producers in the support program on an equal footing with the AEC could be expected. However, it was difficult to envision all the problems that would result from such broadening of the base of the program.

21. The General Electric Company and the Westinghouse Electric Corp. have made inquiries within the past two years concerning their participation in the program as a producer of by-product material for sale to discount certificate holders. While both of these companies have test reactors in operation, definitive future plans with respect to the production and sale of radioisotopes are not readily available.

22. Foreign production of radioisotopes, principally by Canada, Great Britain, and France poses a potential problem, but one of little significance to date. The main issue here is that U. S. suppliers cannot provide foreign procured radioisotopes to users at the reduced price under the existing regulations. Several of the U. S. suppliers prefer foreign sources of procurement for varied reasons.

23. There is another growing development in the area of radioisotopes fabrication that deserves mention, namely, isotopes produced in university owned reactors. As of September 1, 1960, there were 25 such reactors in operation, 14 under construction, and 11 in the planning stage on U. S. university campuses. These

are training and research type reactors most of which are capable of producing radioisotopes in microcurie or millicurie quantities. The current impact of this production on the over-all quantities being produced is insignificant, but the total could grow to a relatively substantial figure in the next few years. The production of shortlived isotopes in university reactors would be particularly advantageous to research activities at these locations. The existing regulations do not extend the discount privilege to this source, and while these regulations could be readily amended, the problems of administration would appear to be most complex and burdensome.

DISCUSSION

24. Alternate Courses of Action. Present circumstances and changing conditions outlined earlier suggest that a point has been reached appropriate for review of the program. It now appears necessary to take one of the two courses of action shown below:

a. Continue the program on the present or an expanded bais.

b. Discontinue the program.

25. The advantages of continuing the program on its present or expanded basis appear to be negligible. This is due to the fact that there are now relatively few institutions that could demonstrate a compelling and continued need for assistance in this limited area. However, there are two remaining advantages of continuance:

a. would be the financial assistance afforded those investigators engaged in research for which their present budgets are inadequate, and circumstances indicate such austere conditions will continue; and

b. the public relations factor and good will accruing to the AEC from the research community as a result of the program. However, this advantage is being counter-balanced by the negative relations created with industry in continuing the support program on any basis, particularly its present restrictive basis.

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26. The advantages of discontinuing the program at the close of Fiscal Year 1961 would include, but not necessarily be limited to the following:

a. Elimination of the present administrative detail on the part of the discount holders, secondary suppliers, AEC contractor-producers and finally the AEC.

b. The advent of private domestic production and increasing foreign production of radioactive material has already generated several regulatory interpretations of the coverage of such outside material under the program. While present and future policy determinations surrounding an expanded base for the program do not in themselves present a problem, the increasing administrative burden growing out of such expansion is readily discernible.

c. To continue the program under its present perimeters, disregarding outside production of radioisotopes would be viewed by all as discriminatory. This is why the alternate courses of action have been reduced to two; i.e., "expand" or "discontinue". Outside forces make it increasingly difficult to continue the program on its present footing.

d. Monetary savings to the AEC of an amount in excess of $250,000 per annum for direct cost of the discounts and an additional undetermined amount for indirect costs of administering the program. These gross savings will be off-set to the extent that those projects included in the 12% supported directly by the AEC, referenced earlier, will receive the additional 80% for isotopes, from the current 20% support under existing contracts to 100% support of the radioisotopes cost under future research contracts.

27. Disadvantages of Each Course of Action. The disadvantages of continuing the program on an expanded basis are essentially the following:

a. Expansion of the program does not appear to be a realistic approach to the problem of fostering the applications of radioisotope tracer technology to biomedical research. This impression is gained from the fact that the program's growth rate has leveled off i.e. the small number of new applications from colleges and universities seeking participation. Some of the factors that would assist in making more precise determinations as to the advisability of continuing the support program are unfortunately not readily available. Such factors would include an estimate of how much curtailment of present valuable research would result from discontinuing the 80% discount on radioactive tracer material. The monetary impact would of course be slight in those universities and other institutions in a position to pay full price. Responses from a few of the smaller institutions indicate the impact on their research program would be appreciable.

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b. Major expansion of the program appears inappropriate in the context of the present need for increased assistance in this area. This is particularly true when weighed against the legal and financial problems that will arise out of any further expansion. If, for instance, private isotope producers were permitted to offer the discount to users, contracts would doubtless have to be made between the AEC and such producers. Pricing variations between AEC established prices and private prices as they relate to the discount would have to be resolved with each such producer. Reimbursement arrangements for discounts granted would likewise have to be provided for. Widening the range of approved applicants to include foreign research and perhaps research of other Federal Agencies would also present several major problems.

It can be seen from the foregoing that many factors both major and minor militate against continuing the program beyond Fiscal Year 1961. At the conclusion of the current fiscal year (FY-1961) the program will have existed for six years. The original objective of introducing radioisotope technology to research areas and institutions unfamiliar with such methods, was and continues to be a good one. However, judging from the pronounced leveling-off of general interest and over-all degree of participation it now appears that a level of success has been attained beyond which significant future progress appears remote. Therefore it must be concluded that discontinuance of the program is the practical and realistic course of action to take with respect to resolving this matter.

28. The disadvantages of discontinuing the program would be confined to essentially the following:

a. As indicated previously a limited number of smaller colleges and universities with modest resources might have to reduce the scope of some of their studies to the extent of the monetary loss of the discount.

b. Prior to the establishment of the present Radioisotope Research Support Program the Chairman of the Joint Committee on Atomic Energy (Appendix "B") indicated to the Chairman of the Atomic Energy Commission the endorsement of the JCAE to consider the proposal of making radioisotopes available to biomedical research at less than cost. Notwithstanding the present state of the program as developed from facts brought out from the recent study, the Joint Committee on Atomic Energy may continue to review the merits of the program to be such as to override other considerations.

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c. The Advisory Committee for Biology and Medicine at the conclusion of a recent meeting expressed the view that a fair number of investigators continue to have need for the radioisotope discount and further indicated that the public relations value accruing to the AEC was well worth the modest investment involved. It should be added, however, that this consensus was predicated principally on the program's life to-date.

29. Implementation. In order to finalize the aforementioned recommended action the following implementing documents will likewise require accomplishment:

a. The Joint Committee on Atomic Energy will be advised of this action by letter such as Appendix "C".

b. A public announcement such as Appendix "D" will be released at an appropriate time.

c. An appropriate recision of Part 37, Title 10 of the Federal Regulations will be published in the Federal Register.

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APPENDIX "B"

CONGRESS OF THE UNITED STATES
Joint Committee on Atomic Energy

August 16, 1954

U. S. Atomic Energy Commission
1901 Constitution Avenue, N. W.
Washington 25, D. C.

Attention: Mr. Lewis L. Strauss, Chairman

Gentlemen:

I am submitting herewith a report of the Joint Committee dealing with the provision of radioisotopes for medical research at less than cost. The full committee has adopted this report and directed that it be forwarded to you for consideration.

Sincerely yours,

/s/

Sterling Cole
Chairman

Enclosure

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REPORT OF THE

RESEARCH AND DEVELOPMENT SUBCOMMITTEE

Providing Radioisotopes for Medical Research

The recent hearings before your Research and Development Subcommittee concerning the contribution of atomic energy to medical research made one point above all others, and that was that the use of radioactive isotopes is a key factor in present day medical research programs. This has brought into sharp focus the Atomic Energy Commission's present program whereby radioisotopes are supplied at cost for medical research projects, except in the special case of cancer research for which isotopes are supplied at 20 per cent of cost.

It is the conviction of the Research and Development Subcommittee that the Commission's policy of supplying such isotopes for cancer research projects at 20 per cent of cost is sound and that this policy should be broadened to include all bona fide medical research.

One of the witnesses, Dr. Nicholas Werthessen of San Antonio, Texas, gave an excellent example of the effect of the present Commission policy on research, and the advantages to be gained by the policy proposed herein by the Subcommittee. He described work which started out to be cancer research, but which evolved into research on hardening of the arteries. Here he was using the same apparatus and the same radioisotope, yet from an ethical standpoint he had to pay $40 for a given amount of Carbon 14 if the end result was to be related to hardening of the arteries, but only $8 for the same amount if the end result was intended to relate to cancer.

We can readily foresee where it would take a Solomon to decide in certain cases just what the most profitable and probably end result of a research job would eventually prove to be. It would seem that this rule, which requires research workers to state whether their objectives are cancer or other medical research is quite artificial, and presents serious administrative problems.

Certainly the present decision to limit the practice to cancer research, while it may appear reasonable to the legal mind, is, as a practical matter, highly artificial and impractical. Many of the witnesses brought out the point that research in one direction oftentimes yields breakthroughs in quite another direction, which it is both desirable and prudent to exploit. However, under the present rules the price of radioisotopes automatically goes up fivefold when the research worker, noting a result or effect, changes his direction from the solution of a cancer problem to some other human ill. This, it appears to us, is neither sound public policy nor does it lead to sound research.

Dr. Werthessen made a second excellent point, which, we believe, applies to all research; namely, that the cost of isotopes is a substantial cost factor to the average research worker who uses them in any quantity. He stated, for example, that his laboratory's budget for Carbon 14 this year was $1800

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and that, because of the success of his work with Carbon 14, he is now going to have to budget $5400 in order to effectively exploit his developments in the coming year. If he could purchase all of his isotopes for research at 20 per cent of cost, he could either purchase more isotopes or have an additional several thousand dollars available to invest in manpower and equipment, thus hastening the day when useful results might be available.

It would seem to the Subcommittee that a very sound argument can be made for aiding all medical research by providing isotopes at less than cost.

The argument for charging any price is the prevention of waste of a valuable material. In this respect, we think it is interesting that Dr. Werthessen commented that he thought the Commission's present policy of charging 20 per cent of cost was very wise and reasonable, or as he put it, "a very good procedure."

The Subcommittee offers the suggestion that the Commission review its policy on pricing isotopes for medical research and seriously consider making isotopes available to all responsible medical research workers on the same basis as they are now available for cancer.

The Atomic Energy Act, we believe, gives ample basis for subsidizing isotopes for research.

> "Section 1. (a) Findings and Declaration.--...
> Accordingly, it is hereby declared to be the policy of the people of the United States that, subject at all times to the paramount objective of assuring the common defense and security, the development and utilization of atomic energy shall, so far as practicable, be directed toward improving the public welfare, increasing the standard of living, strengthening free competition in private enterprise, and promoting world peace.
>
> * * *
>
> "Section 31. (a) Research Assistance.--The Commission is directed to exercise its powers in such manner as to insure the continued conduct of research and development activities in the fields specified below by private or public institutions or persons and to assist in the acquisition of an ever-expanding fund of theoretical and practical knowledge in such fields. To this end the Commission is authorized and directed to make arrangements (including contracts, agreements, and loans) for the conduct of research and development activities relating to--
>
> * * *
>
> "(3) utilization of fissionable and radioactive materials for medical, biological, health or military purposes;"

Certainly this is a most reasonable way to encourage research and improve the public health. The cost to the AEC is not large and other sources must make the major contributions to establish the research projects and provide the running expense budget.

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Such a policy need not impede future commercial production of isotopes in privately-owned reactors, since the Commission could, if desirable, easily bear 80% of the cost of all isotopes sold for medical research. While this situation may not develop for some years, when it does, it will involve a continuation of the subsidy of medical research and will not introduce any new subsidy of private atomic energy licensees.

A second problem was raised concerning the use of isotopes in medical research, as outlined below, and the Subcommittee would appreciate having the benefit of the Commission's thinking on it. One of the witnesses pointed out the lack of standards in chemical compounds used in radioisotope research work. As an example, he stated that the radioactive acetate used in his laboratory was very difficult to compare accurately with the radioactive acetate used in other laboratories on related research throughout the country. The witness asked, "Would it not be feasible for either the Commission or the Bureau of Standards to make available a wider variety of radioactive standardized-compounds for research purposes?"

Lastly, in view of the potentially enormous and manifold benefits that can accrue to mankind as a result of employing radioactive isotopes in research, the Subcommittee believes that furnishing such isotopes as elements and in chemical compounds at less than cost for employment in selected other fields, such as biology, would be very much in the public interest.

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APPENDIX "C"

DRAFT LETTER FROM THE GENERAL MANAGER
TO THE JOINT COMMITTEE ON ATOMIC ENERGY

1. Changing conditions and a need to revamp the regulations governing the operation of the Radioisotope Research Support Program prompted a study to be conducted in evaluation of this program. As a result, the findings developed from this study have led to Commission decision that the termination of the program by the close of Fiscal Year 1961 is both appropriate and desirable.

2. The decision to discontinue the support program was predicated on several key factors. The primary objective of the program, i.e., to introduce and foster the use of radioactive tracers in life sciences research, has in large measure been achieved. Study of the program's growth during the past few years indicates that an indefinite prolongation will achieve negligible success in bringing new institutions into the program. This is due principally to the fact that nearly all installations now use or are familiar with radioisotope technology in biomedical research. This was a fundamental consideration in making the determination to close out the support program.

3. An important contributing factor to this decision was the development of a finding in the study that the majority of scientist participants in the program, or approximately 68%, are otherwise supported with Federal research funds and, presumably, would have little difficulty in obtaining the relatively insignificant additional amount through these sources for their requirements of radioisotopic materials.

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4. It is noteworthy, too, that radioactive material in a variety of forms is becoming available from an increasing number of both domestic and foreign sources, so that the AEC no longer occupies its former role as "sole source of supply." Thus, the Commission finds it would be necessary to expand its regulations governing the conduct of the program to provide the reduced price feature through these additional sources of supply but it has been concluded that the increase in administrative burden thereby occasioned, when compared with evaluation of program effectiveness, does not warrant this action.

5. If the Committee has further questions on this matter or wishes to be supplied with additional information we shall be pleased to provide it.

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APPENDIX "D"

DRAFT PUBLIC ANNOUNCEMENT CONCERNING
TERMINATION OF RADIOISOTOPES RESEARCH SUPPORT
PROGRAM ANNOUNCED BY AEC

1. The U. S. Atomic Energy Commission will end its program of providing radioisotopes at reduced prices for domestic research in biology, medicine and agriculture effective July 1, 1961.

2. From 1948 through 1955 the AEC supported the use of radioisotopes in cancer research and therapy. In 1955 the cancer research program was expanded to include support of other research areas in the life sciences field. During the past six years this program has achieved a reasonable level of success in introducing and encouraging the use of radioactive tracer technology as a basic research tool in the biological sciences.

3. Between 1,000 and 1,200 research projects covered by about 240 discount certificates issued to a similar number of universities, colleges, hospitals, state and private non-profit research institutions, will be affected. In announcing the ending of this support program, the Commission noted that in the past two years lower prices have been put into effect for several key radioisotopes (notably carbon-14 and iodine-131). This will offset, in part, the additional cost to researchers resulting from the withdrawal of the present support program. Further reduction of the cost impact upon the research program will occur through the fact that the greater number of affected research projects are supported in whole or in part by federal agencies. Research projects in this category normally would have their radioisotope costs covered within the terms of their research contract or grant.

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4. The policy announced today results from a review of the program in an effort to assess its continued usefulness. Since the original objective of encouraging the use of radioisotope has been largely achieved, and because radioactive material is becoming increasingly available to the research community, and its applications are now widely recognized, continuance of the support program beyond June 30, 1961 appeared unwarranted.

FORM AEC-804
(8-57)

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

DATE:

INDEX: Isotopes 3

TO:

FROM:

SUMMARY: AEC 814/11 - RADIOISOTOPE REQUIREMENTS
To report large-scale requirements for radioisotopes by government and private users.

FILED: Materials Transuranic Elements

INDEXER- date of paper: 11-21-60

REMARKS-

CONFIRMED TO BE UNCLASSIFIED
DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY: JON S. BUCKNER DOE/NN-623

11-21-60

AEC

Teletype 3 - Auto

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D.C.

No. C-150
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, August 5, 1960)

AEC REDUCES PRICE FOR RADIOCARBON

The Atomic Energy Commission today announced a reduction of 27 percent in the price of carbon 14, an important research radioisotope produced at the AEC's Oak Ridge National Laboratory (ORNL).

The price change, from $13 to $9.50 a millicurie effective July 1, results from lower production costs. An earlier price reduction of 50 percent was effective June 1, 1959.

Carbon 14, a beta-emitter with a half life of about 5600 years, is used by research scientists for "tagging" carbon-containing compounds to determine the part they play in a given process.

In biology, carbon 14-assisted research has been primarily responsible for recent rapid advances in understanding photosynthesis, the process by which plants make their own food. Similarly, it has been used to study the means by which insects are able to build up resistance to insecticides.

Agricultural productivity has been increased by carbon 14 tracer studies on the action of growth-regulators used to control fruit ripening and in causing cotton to shed its leaves before machine harvesting. Investigations using carbon 14-labelled weed killers are contributing to solution of problems of detecting minute residues of these chemicals in crops.

Radiocarbon leads the list of isotopes most frequently used in medical research. Among several hundred current projects

(more)

Cy. filed: VRA - Pricing Policy

P-250

using this isotope are studies of high blood pressure, bacterial infection, anti-biotics, and the action of drugs used to control mental disorders.

Industrial applications include research on development of improved motor fuels and other petroleum products.

Carbon 14 was the first reactor-produced radioisotope made available to the public. Since August, 1946, more than 93,000 millicuries of the material have been sold by ORNL, which is operated for AEC by Union Carbide Corporation.

- 30 -

(NOTE TO EDITORS AND CORRESPONDENTS: This information is being issued simultaneously in Oak Ridge, Tennessee, by the Commission's Oak Ridge Operations Office.)

8560

FORM AEC-304
(9-57)

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

DATE:

INDEX: Isotopes 3

TO:

FROM:

SUMMARY: AEC 720/96 - PRICING POLICY FOR RADIOISOTOPES
It is requested that the Commission approve the above policy & delegate to the GM authority to make exceptions to the full cost recovery and to establish a new price for cobalt 60.

FILED: IR&A 1-1 Pricing Policy Vol. 2

INDEXER: date of paper: 6-23-60

REMARKS:

6-23-60

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

PRESS RUN

No. C-82
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Tuesday, May 3, 1960)

AEC WILL PARTICIPATE IN SOUTHWESTERN INDUSTRIAL RADIOISOTOPE CONFERENCE, DALLAS, TEXAS

With the cooperation and assistance of the U.S.Atomic Energy Commission, six university, industrial, state, and professional organizations will co-sponsor a two-day Southwestern Industrial Radioisotope Conference. The meeting will be held in Karcher Auditorium, Southern Methodist University, Hillcrest at Daniels, Dallas, Texas, on May 16 and 17, 1960. The sponsoring organizations are: Southern Methodist University, Chance Vought Aircraft, Inc., Dallas Chamber of Commerce, Texas Committee on Atomic Energy, Texas Department of Public Health, and the Southwest Chapter of the American Society of Safety Engineers.

The conference is designed to provide information on important industrial applications of radioisotopes and to increase awareness of the industrial opportunities provided through their use. Industry representatives will review the management and economic considerations of utilizing radioisotopes and will discuss improvements in production and efficiency obtained by their use in industrial tracing gauging, and radiography. Commission speakers will review licensing procedures, radiological safety, and government programs of assistance in education and training. A series of brief experience reports by industrial users in the Southwest will be included.

Management and technical personnel and educators wishing to attend the meeting may obtain additional information from Mr. Gerald R. Armstrong, Conference Coordinator, Chance Vought Aircraft, Inc., Box 5907, Dallas, Texas.

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5360

STANDARD FORM NO. 64

Isotopes - 5

Office Memorandum • UNITED STATES GOVERNMENT

TO : W. B. McCool, Secretary

DATE: March 9, 1960

PCA / G.D. Grant

FROM : Paul C. Aebersold, Director
Office of Isotopes Development

SUBJECT: ISOTOPES DEVELOPMENT PROGRAM SUMMARY PLANNING REPORT

We note we omitted your name on the distribution list when we circulated the Isotopes Development Program Summary Planning Report for comments by AEC Divisions and Offices. Attached is a copy of the report. If you should have any comments, we would appreciate receiving them as soon as possible, inasmuch as we wish to transmit the report to the General Manager late this month.

Enclosure:
Summary Planning Report

X-O.M.-2-Isotopes Devel.
O.M.-2-Planning Office

S-960

OFFICIAL USE ONLY

A Summary Planning Report for the ISOTOPES DEVELOPMENT PROGRAM of the U. S. Atomic Energy Commission

December 1959

Prepared by

The Office of Isotopes Development

OFFICIAL USE ONLY

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ISOTOPES DEVELOPMENT

A. Program Description

The Isotopes Development Program seeks to reduce the time lag between the conception of a new principle (basic research) and its practical application ~~(applied research)~~ and to develop a broad technological base for the exploitation of radioisotopes and radiation in important areas of the national economy including industry, agriculture, medical products and research. Although radioisotopes have been available and the basic principles of use known for the past two decades their broad application is, with limited exceptions, relatively unexploited. Major developmental work is carried on by several geographically distributed university centers, private research laboratories, AEC national laboratories and a limited number of industrial organizations and government agencies. Management direction is provided through four subprograms:

1. Isotope Technology Development

   This subprogram develops a wide spectrum of isotope principles and techniques which can become useful tools for science and industry. (The various techniques under development are described on pages ~~15-17~~ 15-13.)

2. Industrial Process Radiation Development

   This subprogram is aimed at developing the important energy capability of ionizing radiation for industrial processes. (Sources of ionizing radiation are fission by-products, reactor produced isotopes, radiation machines and nuclear reactors. Industrial processes include all chemical, physical and biological changes of commercial interest that might be induced by ionizing radiation alone or in conjunction with other forms of energy inputs such as pressure and temperature or reaction controllers such as catalysts.)

3. Isotope Technology Training

   This subprogram seeks to compensate for the serious lack of isotope technology training among scientists, engineers, industrial management, labor leaders and state health and safety officials. To meet this problem training activities are being carried out by regional information meetings and seminars for industrial managers, engineers and scientists, courses at the Oak Ridge Institute of Nuclear Studies including laboratory instruction and assistance, including equipment grants, to colleges and universities to aid in integrating isotope technology into their existing curricula.

4. Isotope Process Development, Production and Marketing

   This activity provides radioisotopes and radiation sources produced in AEC facilities to meet the changing needs of advancing science and technology. The production and marketing program attempts to

achieve a balance between encouraging practical applications and research and development, stimulating private sources of supply and providing reasonable compensation to the Government. The process development program assures the availability and safety of radioisotopes and radiation sources.

B. Basis for AEC Involvement

Atomic Energy Act of 1954 as amended: Sections 3a and d -- "Purpose", Section 31 -- "Research Assistance", Section 32 -- "Research by the Commission", and Chapter 8 -- "By-product Material".

C. Basic Assumptions

1. Successful application of radioisotopes and high intensity radiation sources ~~in industry~~ will have major economic significance and public benefit.

2. Development of new radioisotope and radiation technology solely through private efforts will not progress in a manner to afford greatest national benefit in the near term future.

3. Judicious participation by the government in supporting research and development where gaps exist in radioisotope and radiation technology will accelerate realization of the benefits from this important area of atomic energy development.

4. When sufficient basic technology is available, industry will do the necessary engineering and applications development of devices, gages, instruments, etc. for routine economical use in manufacturing and processing operations.

5. Substantially increased training opportunities in industrial isotope technology will be a major factor in bringing about the widespread use of radioisotopes and radiation.

D. Program Objectives

The prime objectives of the Isotopes Development Program are to

1. Advance radioisotope and radiation technology sufficiently to enable and encourage potential users to develop routine and economically feasible applications.

2. Accelerate the realization of the potential contribution of radioisotope and radiation applications to the national economy and welfare.

3. Make an important contribution to U. S. world leadership in the peaceful uses of atomic energy.

4. Stimulate private participation in radioisotope production and marketing.

Subprogram objectives are to

5. Develop new technology and improve existing radioisotope methods having broad application in industry, agriculture, medicine and research.

6. Develop radioisotope technology in areas of major public interest such as water resources and air pollution.

7. Develop compact and self-sufficient radioisotope power sources.

8. Demonstrate the economic and technical feasibility of applying ionizing radiation energy from radioisotope sources and process radiation reactors to industrial and agricultural operations.

9. Build a reservoir of persomel trained in radioisotope technology in industry and educational institutions.

10. Create better public understanding of the benefits of radiation use.

11. Supply radioisotopes to the extent they are not available from private sources for both private and Government interests.

12. Develop new and more economical radioisotope sources and production methods, including fission product recovery techniques.

E. Program Guidelines

1. Approved Policy

   a. Individual proposals for isotopes development contracts will be evaluated on the basis of the following general criteria: (AEC 994/2)

      (1) Potential contribution to the national economy and welfare

      (2) Advancement of technology

      (3) Uniqueness of proposed development activity

      (4) General applicability to industry

      (5) Application to key industries where radioisotopes have not been exploited

      (6) Specific experience in area of proposed development

      (7) Competence and responsibility of the applicant, including organization, experience, facilities and financial responsibility

      (8) Cost to AEC

   b. Work will be carried out either in AEC laboratories or in privately owned facilities having special skills or equipment. (AEC 994/2)

   c. The AEC should intensely prosecute the use of isotope tracers for the location of water in arid countries. (October 24, 1958 memo from McCone to General Manager)

   d. Isotope production, pricing and marketing activities should be specifically designed to encourage widespread use as well as development of a market attractive to private production. (AEC 994/2)

   e. The pricing policy for the sale of isotopes is to charge the higher of full costs or the going commercial rate. (AEC 720/7)

   f. The Commission will provide atomic energy products and services until such time as they are reasonably available from commercial sources. (Approved by various Commission actions.)

2. Policies Under Consideration

   A new staff paper entitled "Commission's Domestic and Foreign Education Program in the Life and Physical Sciences and Engineering" has been prepared and is now in the General Manager's office awaiting

approval. The staff paper proposes a five-year program to establish a capacity in the colleges and universities to meet the increasing demand for trained nuclear scientists, engineers and medical personnel.

3. Other Organization Interests and Requirements

The Department of Defense in February 1958 requested that the Atomic Energy Commission assume responsibility for the design, construction and test operation of a Cobalt-60 facility (High Intensity Food Irradiator) for the U. S. Army Ionizing Radiation Center planned for Sharpe General Depot, Stockton, California. In October 1959 the Department of Army announced deferral of the U. S. Army Ionizing Radiation Center and requested that the AEC continue the HIFI contract with minimal effort, pending a current review of radiation sources for the Army Radiation Preservation Food Program.

4. Commitments

a. The President in a major foreign policy speech before the U.N. General Assembly on August 13, 1958, emphasized the use of isotopes in developing water resources in the Middle East.

b. Chairman McCone before the 1959 JCAE 202 Hearings said: "The Joint Committee has seen . . . the small atomic battery powered with isotopes which converts the heat of radioactivity decay directly into electricity . . . Possible industrial uses of this device will be explored."

c. Commissioner Williams in a speech before the Third Industrial Nuclear Technology Conference on September 23, 1959 stated: "Above all, however, the Commission feels that it is in the public interest in the case of isotopes to reduce the lag time between the conception of a new principle and its practical application, the gap between basic and applied research . . . We in our program will be concentrating more and more effort on possible applications of isotope technology to problems such as pollution of air and water which affect the welfare of all people . . . To the extent that radioisotopes can contribute to increased production through increased efficiency, and, therefore, to the national economy and welfare, the Commission believes that its Isotopes Development Program is fully justified."

F. Program Relationships

1. Other AEC Programs

a. Physical Research

The industrial process radiation subprogram is based upon the new concepts and research results growing out of the physical research programs.

b. Biology and Medicine

The Biology and Medicine and Isotopes Development Programs exchange information in fields of common interest, for example, the radiation preservation of food.

c. Reactor Development

(1) The industrial process radiation subprogram is primarily concerned with chemicals that may be produced in process radiation reactors and with optimum system requirements for their production in reasonable yields at reasonable costs. The Reactor Development Program is concerned with the problems that chemical system requirements will impose upon reactor technology.

(2) Isotope program encouragement of private interest in reactor production of radioisotopes and in fission product recovery assists the various reactor development fuel cycle programs.

(3) The principles of the SNAP III device already developed under the reactor development program will be used by the Isotopes Program in developing a Strontium-90 generator.

(4) The isotopic power sources for reactor development's SNAP programs will be provided by the isotope production program.

d. Special Nuclear Materials Production

(1) The effluent from chemical recovery plants which process fuels from reactors producing special nuclear materials is processed to recover fission product isotopes.

(2) The process development activities of the isotope program result in flow sheets that can eventually be used in a large scale fission product recovery facility.

(3) If megacurie quantities of fission product isotopes were to be supplied by AEC, they would presumably be produced under the Special Nuclear Materials Production Program.

e. Training and Education

Isotopes technology training in the physical sciences supplements, but does not duplicate, other AEC training programs in reactor technology and the life sciences.

f. International Affairs

The Atoms-for-Peace Program provides for exchanges of scientific personnel and information in the field of radioisotope technology.

g. Licensing and Regulation

All Isotopes Development Program off-site contractors are subject to appropriate AEC licensing and regulatory requirements.

h. All Programs

The Isotopes Development Program furnishes radioisotopes for AEC research and routine use as well as information about isotope utilization.

2. Programs Being Conducted or Planned by Others

a. Generator for Remote Weather Station

AEC is developing for Weather Bureau testing and operation a five watt, Strontium-90, electrical generator for a remote automatic weather station.

b. Radioisotope Technology Training

Cooperation with the National Science Foundation in radioisotope training provides for AEC payment of operating funds for summer institutes and NSF payment of a stipend and travel expenses for each participant.

c. High Specific Activity Cobalt-60 Source

Under consideration is a National Bureau of Standards request for AEC to provide without charge a high specific activity Cobalt-60 source for radiation chemistry and dosimetry studies.

d. Effects of Ionizing Radiation upon Coal, Petroleum and Minerals

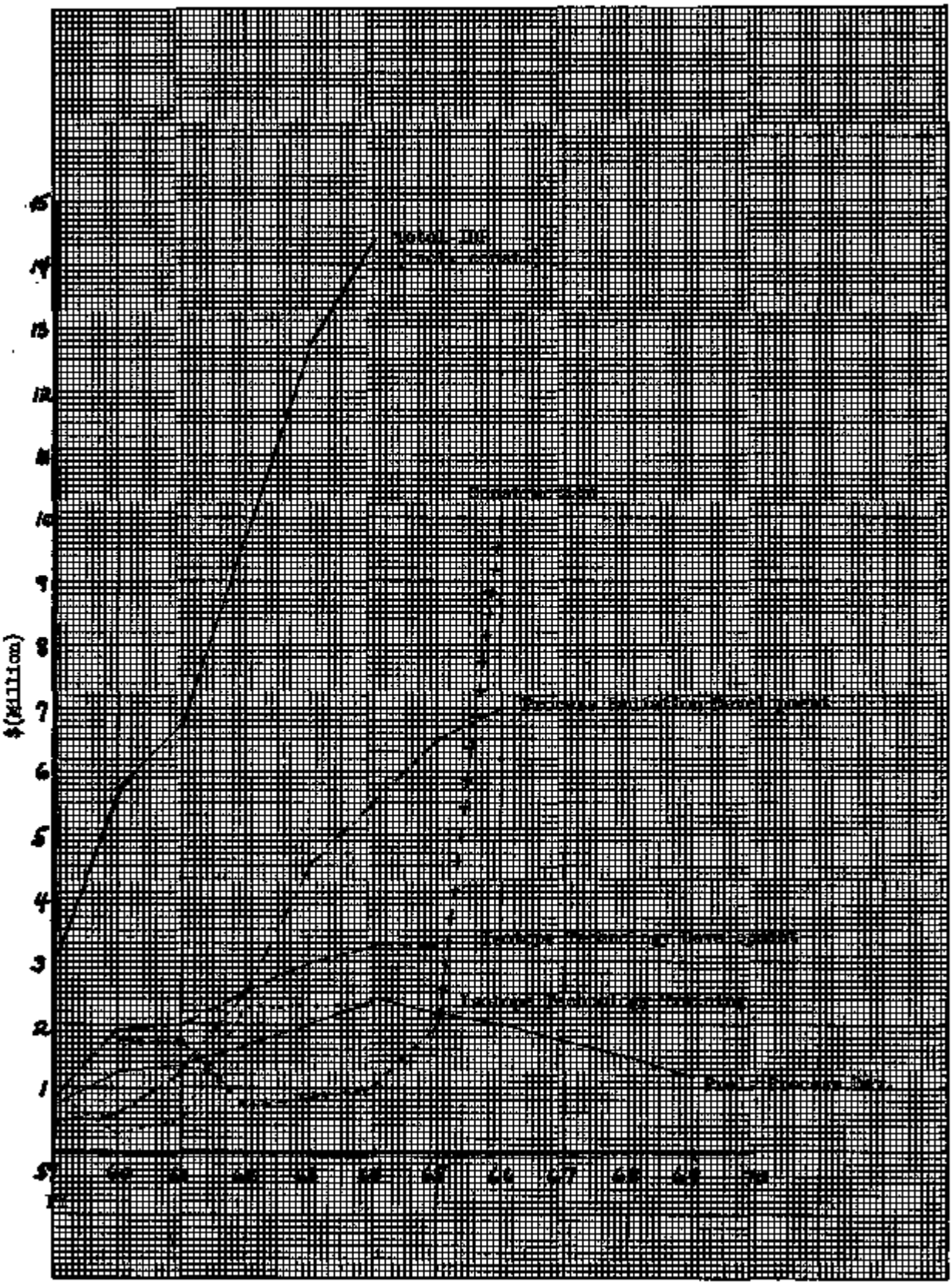
Also under study is AEC participation with the Bureau of Mines in studies of the effects of ionizing radiation upon coal, petroleum and minerals. The Bureau plans construction of a versatile 100,000 curie Cobalt-60 irradiation facility.

e. Radiation Preservation of Food

Currently under evaluation is a Department of Agriculture proposal to construct a portable irradiator for work on radiation preservation of food stuffs and a Department of Interior proposal for a cooperative program to determine the commercial feasibility of extending the shelf life of fish by irradiation.

f. Water Resources, Food Technology and Coal Industry Applications

Within fund availability cooperative programs to apply radioisotope technology in these fields (as opposed to the industrial process radiation applications described in d. and e. above) will be carried out with the U. S. Geological Survey, the Food and Drug Administration, the Department of Agriculture and the Bureau of Mines. AEC will develop techniques and devices while the other agencies will seek to apply these techniques to actual testing and field operations.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G. Resources Required

1. Financial

The chart on the opposite page reflects AEC funds estimated to be required for attaining the program objectives. The level of effort is approved only through FY 1961. Note also that:

a. Total program costs are estimated only through FY 1964. At this time there is insufficient experience available for projecting costs for all subprograms beyond FY 1964.

b. Only AEC costs are shown. Expenditures by private sources are not presently available.

c. Training costs assume approval of the proposed staff paper on training activities.

d. Construction costs are included for certain of the required facilities described in a later section.

e. Current isotope production and distribution costs of approximately three million dollars per year are not indicated in the chart as they are more than off-set by revenues from their sale. Over the next decade sales and costs will probably increase for several years as industry demands more products and then decrease as industry itself begins to supply radioisotopes. At all times, however, the net cost to the Commission will be zero.

f. Production equipment costs are included although they will be recovered through subsequent isotope sales.

g. See "Problems Presently Foreseen," Item 1, page 21, concerning the forecast of program costs.

2. Technical and Scientific Personnel

The success of the Isotopes Development Program heavily depends on the availability of personnel adequately trained in radioisotope technology. Recent surveys conclude that approximately 1,000 scientific and engineering personnel trained in basic and industrial isotope and radiation technology will be required annually to meet the nation's industrial demand. Current training is providing only approximately 25% of this requirement.

3. Authorizations

New construction projects (see next item).

4. Major Equipment and Facilities

a. For The Industrial Process Radiation Development Subprogram

(1) High level radiation development laboratory at Brookhaven (Already approved; construction underway)

(2) Gamma process development irradiator (Authorized 1959; funds to be requested in a future year)

(3) Beta process development irradiator

(4) Process radiation reactor

A cooperative project with the Reactor Development Program. Only the Isotopes Development Program's share of the total cost is included under the "Financial" section above.

Note: Items (3) and (4) depend upon Commission approval of a forthcoming staff paper. Potential costs are included under "Financial Requirements."

b. For the Process Development, Production and Marketing Subprogram

(1) Radioisotope process development laboratory at Oak Ridge. (Already approved; project begun)

(2) Hot isotope separation facility

For the production of enriched and high specific activity radioisotopes. High radiopurity isotopes are primarily of research and medical interest. Costs are included under "Financial Requirements."

(3) Fission product recovery facility

The decision as to whether or not to construct (possibly through a major modification of an existing facility at Hanford) a full scale fission product recovery plant will depend upon the growth of large scale fission product markets and the interest of private industry in investing in such a facility. Costs are excluded from the "Financial Requirements" estimate.

(4) High flux isotope production reactor

Similarly, the demand that may materialize for high specific activity isotopes produceable only in high flux reactors cannot be identified at this time. Costs are excluded from the "Financial Requirements" estimate.

H. Implementing Efforts Authorized and Underway

1. Isotope Technology Development Subprogram

a. Radiometric Analysis and Tracer Technology

Radiometric methods of analysis provide unique sensitivity and specificity for quantitatively measuring exceedingly low concentrations of materials such as environmental contaminants. Tracer techniques possess the capability for making important technical and scientific measurements not possible by other conventional methods. Efforts are being directed toward developing these approaches and techniques. (Relevant targets #2, 3, 5 and 6, page 17.)

b. Activation Analysis

Through use of neutron beams and sensitive radiation measurement systems, it is possible to perform instantaneous analysis of many materials not possible in any other way. This method currently remains undeveloped except as a laboratory tool for specialized problems. Research will be undertaken to investigate the limits of sensitivity for additional elements and means of increasing resolution by computer techniques and to develop automatic analyzers to permit fast simultaneous analysis of complex mixtures. (This work is in progress but specific target dates cannot be identified at present.)

c. Radioisotopes Fluid Dynamics Techniques

Development of radioisotope hydraulic and fluid dynamics techniques will provide widely useful tools for exploration and conservation of water and other natural resources. Conventional procedures are not sufficiently sensitive and specific for solution of many of these urgent public problems.
(Relevant target #4, page 17.)

d. Isotopic Power and Ionization Technology

Research and development will be undertaken on isotopes, particularly fission products, to examine their feasibility for isotopic power. In addition, feasibility investigations will be initiated for utilization of large quantities of fission products to regenerate the reactants in chemical fuel cells for small power units.
(Relevant targets #1 and 7, page 17.)

e. Isotope Measurement Systems

Development of low level counting techniques and measurement systems will open new means of using very small quantities of radioisotopes in ground water studies, chemical processes, and general tracer

techniques. Successful development should lead to application of low level tracing techniques to production and process control, as well as to sewage and industrial water pollution problems which hold vast potential for public benefit. (This work is in progress but specific target dates cannot be identified at present.)

f. Gamma Absorption Analysis

The number of available gamma emitting radioisotopes useful as sources of radiation for gamma absorption analysis is extremely limited. Further development of gamma absorption analysis technology using low energy photons depends upon development of secondary X-ray radiation sources. Development of such low energy radioisotopic sources will provide new research and engineering tools for non-destructive testing of metals, biological materials and chemicals, as well as providing radiation sources for medical radiography units. (This work is in progress but specific target dates cannot be identified at present.)

g. Non-destructive Testing

Radiosotope techniques for non-destructive testing should be encouraged as they can play an increasingly important role in missile, aircraft and ship construction as well as many other important industrial applications. (This work is in progress but specific target dates cannot be identified at present.)

2. Industrial Process Radiation Development Subprogram

a. Radiation Process Kinetics

This refers to studies on the relative yields of reaction products for any selected chemical reaction mechanisms through controlling convenient parameters such as temperature, pressure and phase (solid, liquid or a gas). Radiation process kinetic research on promising radiation reactions will provide a broad base of information to encourage industrial research efforts.
(Relevant targets #5 and 15, page 18.)

b. Radiation Reaction Mechanisms

Radiation process kinetics research presumes that sufficient information is available on a reaction mechanism for valid and beneficial kinetics studies. While this may be true in certain instances, it cannot be categorically stated that the given reaction mechanism is the only route by which a radiation reaction may proceed. There may be other reaction routes, as yet undiscovered, which will ultimately lead to improvements in radiation processes.
(Relevant targets #1, 4, 6 and 11, page 18.)

c. Radiation as a Unit Operation

The problem exists of developing the design of radiation sources as an engineering science; experimental work on systems of interest to both industry and government must be performed. There is great need for information concerning the specific distribution of absorbed energy in matter. There is also a need for a handbook which will permit the design, with minimum research and development work, of pilot plant and demonstration facilities for radiation processes that have been found technically, and appear economically feasible.
(Relevant targets #2, 13, 14, 16 and 17, page 18.)

d. Use of Process Radiation Reactors

The use of nuclear reactors as sources of ionizing radiation for industrial processing appears to be an economically attractive application. Problems to be solved before such use can be brought about are numerous and a long range effort is required. Processes using reactor radiation must be developed, and for promising processes, the problems associated with design of reactors must be defined and attacked.
(Relevant targets #3 and 15, page 18.)

e. Industrial Process Radiation Feasibility Study

From time to time, the Isotopes Development Program will engage in activities to provide industrial and government management with basis for decisions on programmatic efforts with respect to certain industrial process radiation applications. Targets 3, 6 and 8, page 18, are examples of these kinds of activities as related to process radiation reactors, medical supply sterilization and radiation preservation of food respectively.
(Relevant targets #3, 6 and 8, page 18.)

f. High Level Dosimetry

Development of dosimetry systems that will satisfy the requirements of industrial process radiation is one of the major steps necessary before ionizing radiation can become a processing tool for industry. There are not yet any truly acceptable techniques for radiation process control.

g. Remote Handling Equipment

One of the major problems mitigating against high intensity radiation as a processing tool is the lack of adequate, low cost, routine use remote handling equipment. Concepts of remote handling and maintenance for radiation processing have not been developed. While such problems appear small compared to those of handling fuel elements at chemical separations plants, they may require far different concepts than just less complex adaptations of those presently used in high radiation fields.

h. Submission of Staff Paper on Industrial Process Radiation

See target #12, page 18.)

It is anticipated that a staff paper outlining a definitive program for developing industrial process radiation will be submitted for Commission consideration early in 1960. The paper will request a level of effort over an extended period for the projects stated in a. through g. above. To this extent the paper will ameliorate part of problem 1, page 21. *

In addition the paper will request authority for industrial process radiation feasibility demonstrations. In order to synthesize the results of work performed under other subprograms, it will be necessary to construct developmental or pilot plant irradiators. These irradiators will be designed around promising radiation processes or types of processes and will provide the final step in the Industrial Process Radiation program. Authorization to construct a beta and a gamma process development irradiator as well as an industrial process radiation reactor will be requested.

It must be noted that such construction depends upon positive results of feasibility studies.

3. Isotope Technology Training Subprogram

Targets of implementing efforts under this subprogram are identified on page 19 of the "Target Schedules." Additional implementing efforts will depend on approval of the training staff paper referenced earlier.

4. Process Development, Production and Marketing Subprogram

a. Chemical Process Development

Research and development on fission product recovery is necessary with greater attention given to developing recovery processes for wastes from power reactor fuel processing. Other fields in which increased study is required include the effect of radiation on the chemistry of radioisotope processing, continuing improvement of existing radioisotope processes, separation of ultrapure fission products for cross-section measurements and collection and dissemination of information concerning radioisotope processing techniques. The principal new separation methods to be studied are solvent extraction, ion exchange, electroplating and electromigration in fused salts.
(Relevant target #7, page 20.)

b. Radiation Source Development

Research and development on radiation source properties is

necessary to insure efficient and safe utilization of radioisotopic sources. Knowledge of certain physical and chemical characteristics of solid radioactive compounds, such as thermal conductivity, thermal stability, specific power output, radiation stability, corrosive action on containers and Bremsstrahlung emission should be developed. This information is required to provide the technology needed to design sources utilizing optimum shielding and insuring safe containment of radioactive materials.
(Relevant targets #4 and 6, page 20.)

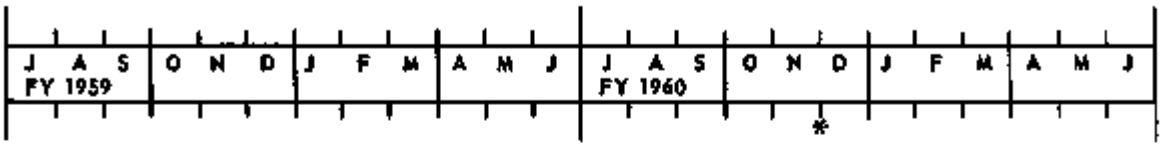
c. New Isotopes

It will be necessary in the future to conduct research and development programs in support of developing the technology for production of radioisotopes in high flux reactors by (n,y), (n,p), (n,γ), (n,2n) and triton reactions, and defining the physical and chemical properties of radioisotopes as pure elements and as various compounds.
(Relevant target #7, page 20.)

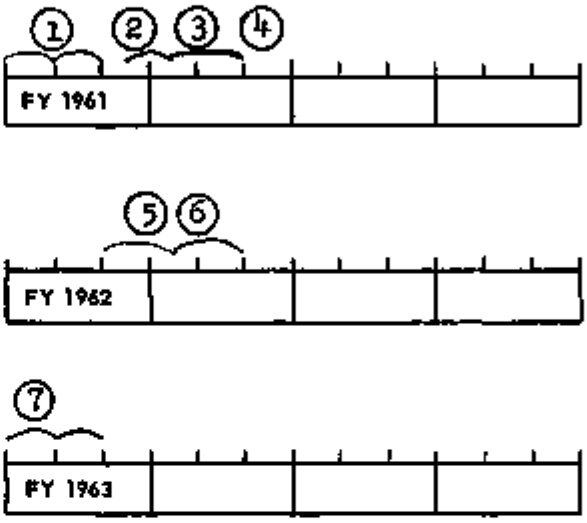
I. Target Schedules

1. Isotopes Technology Development

PLAN



ACTUAL



Strontium-90 power generator for remote automatic weather station:

1. Device completed
7. Testing by Weather Bureau completed

High altitude ozone and moisture analyzers:

2. Device completed
5. Testing by Weather Bureau completed

Ozone and sulfur dioxide analyzers for air pollution:

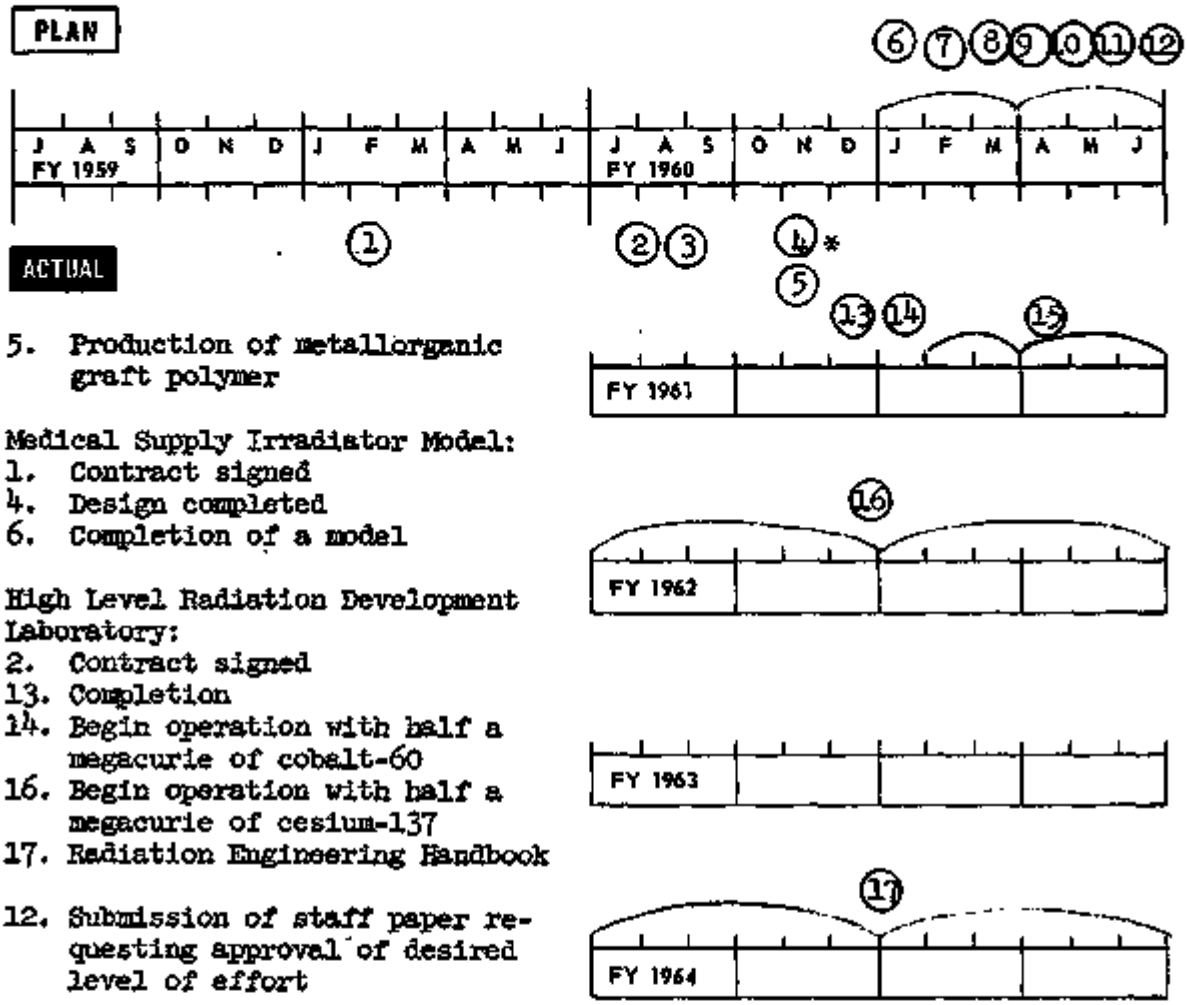
3. Units completed
6. Testing completed by air pollution control research groups

4. Study of potential applications of radioisotope techniques in water resource problems completed. As incremental reports are submitted specific r&d tasks will be initiated

* Reporting Date

(1) CURRENT PLAN (with circle)
1 ORIGINAL PLAN (without circle)

2. Industrial Process Radiation Development



5. Production of metallorganic graft polymer

Medical Supply Irradiator Model:
1. Contract signed
4. Design completed
6. Completion of a model

High Level Radiation Development Laboratory:
2. Contract signed
13. Completion
14. Begin operation with half a megacurie of cobalt-60
16. Begin operation with half a megacurie of cesium-137
17. Radiation Engineering Handbook

12. Submission of staff paper requesting approval of desired level of effort

8. Report on evaluation of technical feasibility of radiation preservation of fish

Cesium-137 Research Irradiator:
7. Construction started
10. Completion

11. Initial experiments on ion-molecule reactions using new coincidence mass spectrometer

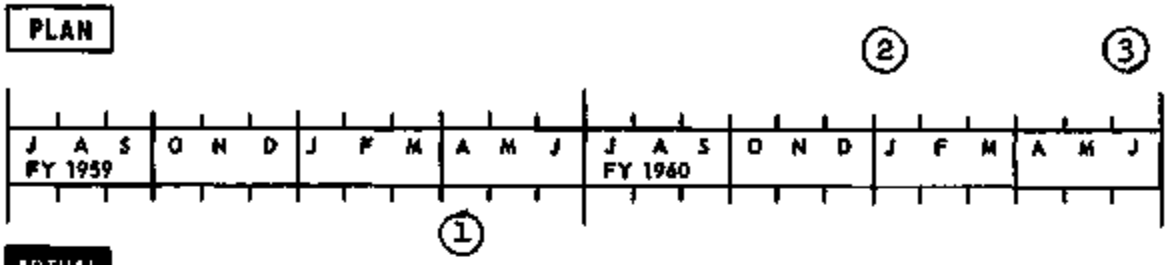
Industrial Process Radiation Reactor:
3. Study of use of glass fibre fuel nuclear reactor for production of fixed nitrogen
9. Study of use of smoke fuel nuclear reactor for production of fixed nitrogen
15. Initial production of fixed nitrogen in high temperature, high pressure reactor loops

* Reporting Date

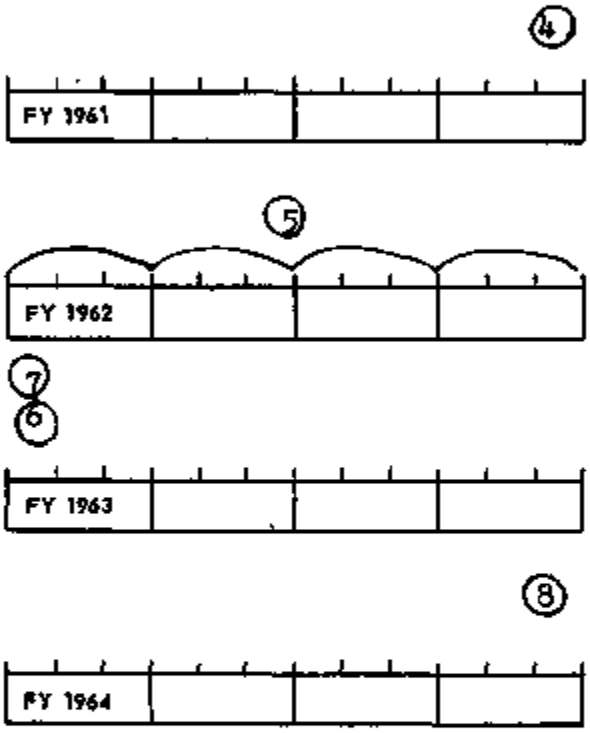
(1) CURRENT PLAN (with circle)
1 ORIGINAL PLAN (without circle)

3. Isotope Technology Training

PLAN



ACTUAL



1. Second prototype course at Oak Ridge Institute of Nuclear Studies completed

2. Submission to General Manager of staff paper on training activities

3. ORINS attains level of five general radioisotope courses per year

4. General orientation meetings with professional groups increased to level of five per year

**5. Increase colleges receiving assistance and equipment grants to 200 and universities to 100. This permits:

6. ORINS program reorientation to short, intensive courses in advanced technology

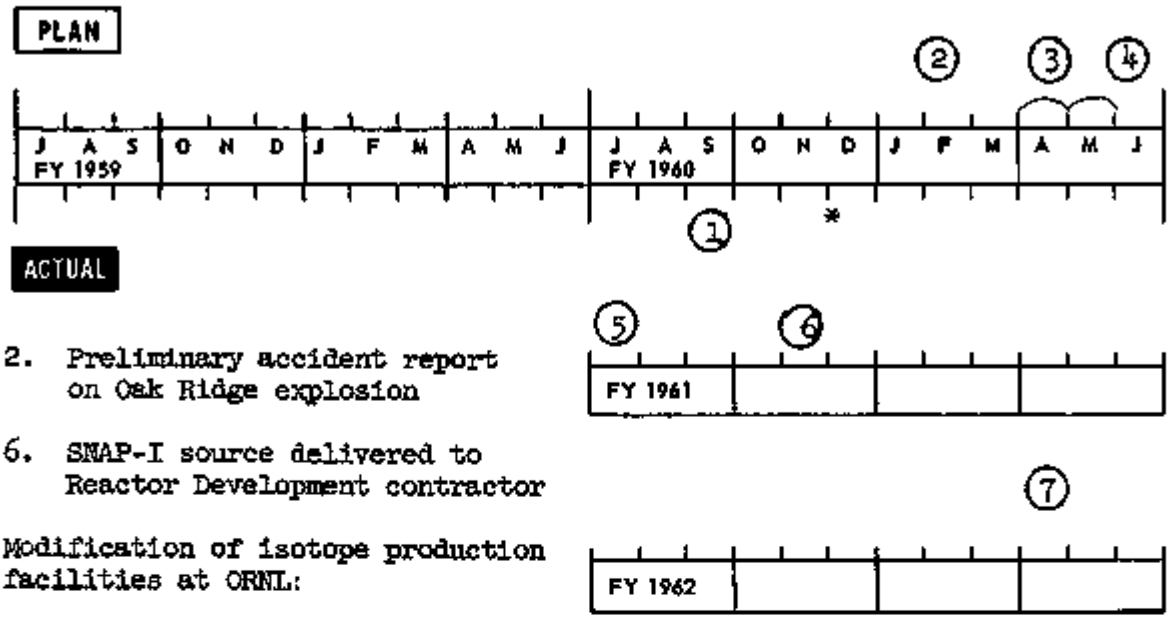
7. Inaugurate highly technical seminars in cooperation with trade and professional organizations

**8. Fifty schools receive final round of equipment grants

* Reporting Date
** Assumes adoption of staff paper on training activities

(1) CURRENT PLAN (with circle)
1 ORIGINAL PLAN (without circle)

4. Isotope Process Development, Production and Marketing



2. Preliminary accident report on Oak Ridge explosion

6. SNAP-I source delivered to Reactor Development contractor

Modification of isotope production facilities at ORNL:

1. Work began
5. Completion

Radioisotope process development laboratory at ORNL:

3. Work begins
7. Completion

4. Strontium-90 power generator source for remote weather station delivered. (See Target number 1, page 23.)

* Reporting Date

(1) CURRENT PLAN (with circle)
1 ORIGINAL PLAN (without circle)

J. Problems Presently Foreseen

1. Level of Effort to Meet Objectives

The financial resources considered necessary by the Office of Isotopes Development indicate a substantial increase in the current level of effort is required. Future staff papers and the annual budget request to the Commission will propose the desired levels of effort.

2. Who Should Perform Research and Development

A definitive policy is needed concerning whether and to what extent and under what circumstances research and development should be carried out in the national laboratories. The Commission report to the JCAE on the growth and status of the national laboratories and possible hearings early next year may contribute to the solution.

3. AEC Patent Requirements

Current AEC patent policy inhibits recognition of industry's proprietary rights in their development of radioisotope applications. As a result increased development and utilization is hindered. This problem requires Commission-wide consideration before a solution can be proposed.

4. Understanding by the Congress and the Bureau of the Budget

The Congress and the Bureau of the Budget have the impression that the Isotopes Development Program is engaged in activities that can or should be carried out by industry. An information memorandum clarifying the pertinent facts will be prepared by the Office of Isotopes Development.

5. Training

The present uncertainty within the Commission on the duration and scope of equipment grants makes it difficult to conduct an educational assistance program that is well organized and recognizes varying needs. Approval of the proposed staff paper on training would solve this problem.

6. Defining the Criteria and Conditions of AEC Withdrawal from Providing Materials and Services in Favor of Private Suppliers

The general policy is that the Commission will not compete with industry; however, the criteria for withdrawal are not clearly defined. For example, we must consider the effort of changes in quality and cost of radioisotopes on users as a result of withdrawing. Further staff discussions are necessary before definitive criteria can be recommended.

7. Pricing Policy

The present Commission pricing policy is to charge the higher of full

costs or the going commercial rate. This policy may not in some cases adequately reflect all the criteria in Section 81 of the Atomic Energy Act; the problem is under study.

8. Licensing

The cost and time delay of obtaining an AEC byproduct material license is at present a specific deterrent to increased radioisotope utilization. It is understood that this problem is receiving the continuing attention of the Division of Licensing and Regulation.

9. Health and Safety

Industry is often reluctant to accept new techniques having the unfamiliar hazards of radiation. The isotope technology training subprogram is designed to overcome this reluctance.

10. Determining Fission Product Markets

The Office of Isotopes Development per AEC 814/7 has the responsibility for determining civilian and non-DOD and non-NASA government agency fission product requirements. Methods to survey and research these markets on a systematic basis are under continuing study.

APPENDIX "A"

PROGRAM HISTORY

The Isotopes Program began under the Manhattan Engineering District with the distribution of radioisotopes to non-project users. The first proposal for national distribution of radioisotopes was made in January, 1946, and soon afterwards an isotopes division was established at the Oak Ridge MED Office. The first public announcement that reactor produced radioisotopes were available was in June, 1946, and the first shipment, a small unit of carbon 14, was made to the Barnard Cancer Hospital in St. Louis on August 2, 1946. This also signified the first private participation in the peaceful uses of atomic energy.

Distribution of radioisotopes and their obvious and immediately profitable applications continued to grow. This growth provided the impetus for the first public issuance of health and safety regulations.

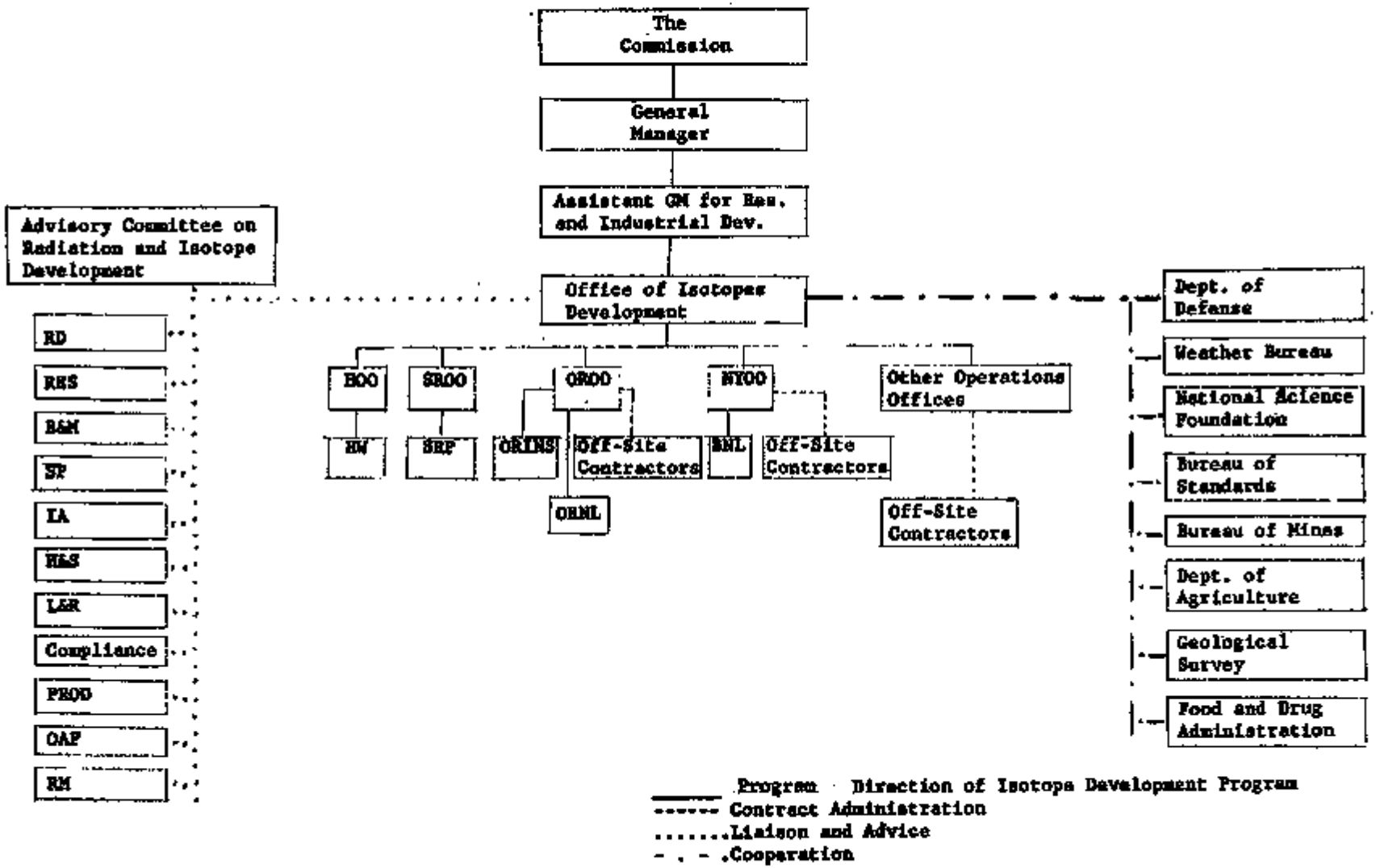
With passage of the Atomic Energy Act of 1954 the authorizations for using byproduct material changed to a licensing program. In recognition of the regulatory aspects and also of isotopes becoming a Commission-wide national program, the Isotopes Division at Oak Ridge was transferred during 1957 to the AEC Washington Headquarters. In May 1957, the Commission established a specific Isotopes Development Program which was later defined in two major staff papers to consist of the present four subprograms.

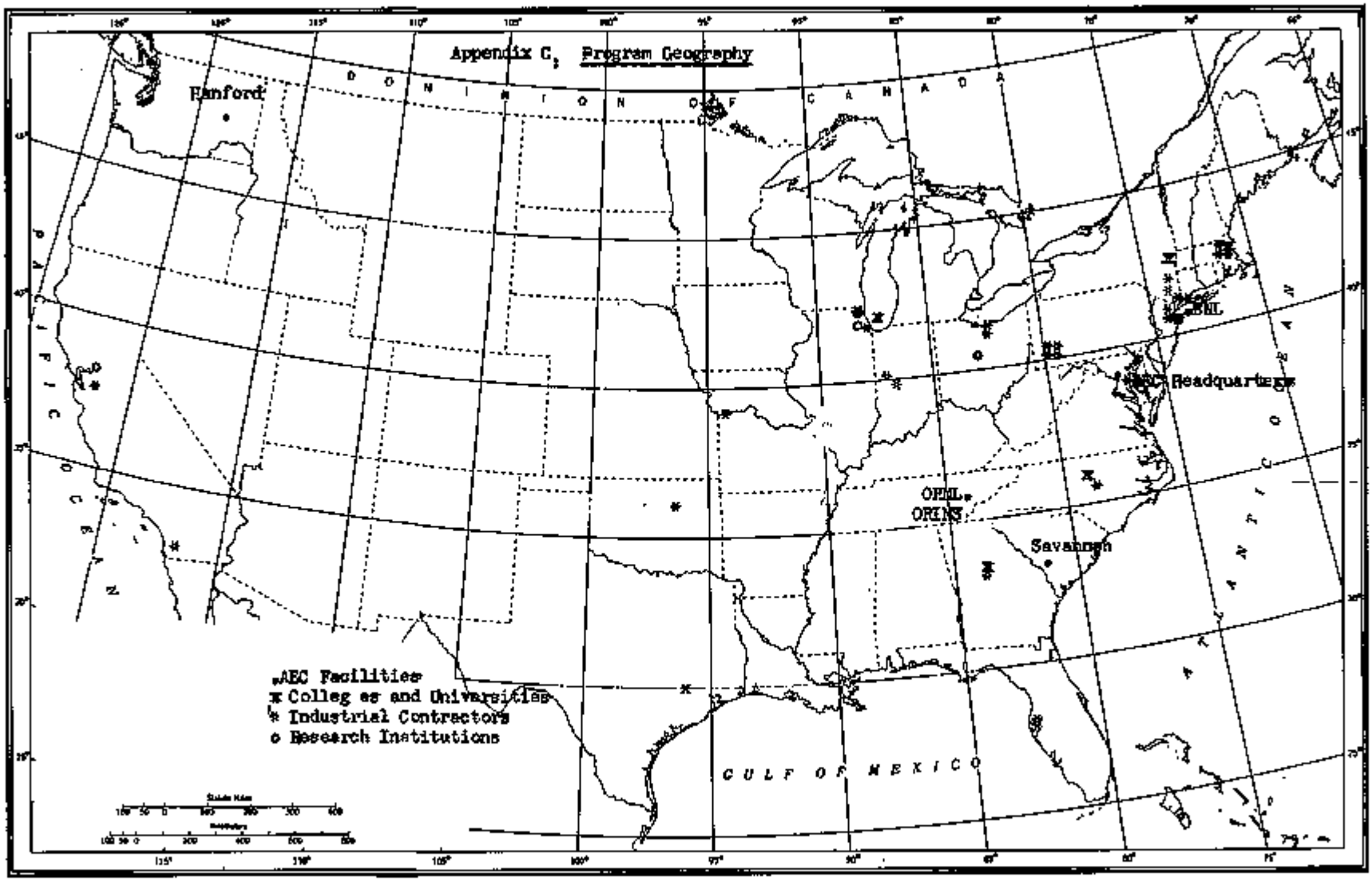
As a result, the first funds for isotope development activities, other than for the production and distribution program, were obligated late in FY 1958. During FY 1959 the first full year of activity under the program, costs of 3.1 million dollars were incurred.

Further impetus was provided in October 1958 when responsibility for the program was vested in the new Office of Isotopes Development.

APPENDIX B

ORGANIZATION FOR ADMINISTRATION OF THE PROGRAM




Appendix C, Program Geography
Hanford
DOMINION OF CANADA
BNL
AEC Headquarters
ORNL
ORINS
Savannah
AEC Facilities
Colleges and Universities
Industrial Contractors
Research Institutions
GULF OF MEXICO

"APPENDIX D"

GLOSSARY

Activation analysis -- analytical method in which sample is subjected to activation by neutrons, deutrons, or other irradiation for appropriately chosen lengths of time and chemical elements identified and assayed by analysis of the resulting decay curve.

Beta Particle -- electrons released by radioactive atoms which are decaying to stable forms.

Bremsstrahlung emission -- secondary photon radiation produced by the deceleration of charged particles passing through material.

Curie -- a measure of the amount of radioactive material.

Fission Products Radioisotope -- a radioisotope produced as a direct result of the fissioning of uranium or plutonium.

Gamma Absorption Analysis -- an analytical procedure of utilizing the fact that certain organic radicals absorb gamma radiation of specific wave lengths.

Gamma Rays -- waves of energy similar to light or radio waves emitted by a nucleus.

Ionizing Radiation -- energy emissions such as gamma and beta radiation which are capable of inducing chemical, physical or biological changes.

Ionization Technology -- involves use of radiation to create small electrical charges for beneficial purposes. Applications include elimination of static from moving materials, improving operational characteristics of electron tubes, generation of light, etc.

Isotope -- one of two or more species of an element having the same number of protons in the nucleus, but differing in the number of neutrons.

Isotope Measuring Systems -- involves electronic, chemical, and mechanical means for detecting and measuring characteristic radiation from the different radioisotopes. These radiations may be used to control various chemical, physical and mechanical systems.

Isotopic Power -- the use of radioisotope ionization or heat of decay to produce electricity.

Non-destructive Testing -- involves detailed internal analysis by radiation of items and devices without deleterious effect to them. The critical item may be given a 100% test to assure operational fitness.

Radioisotope -- if the order of the particles within a stable atomic nucleus is disturbed, the atom becomes unstable. In such a case the particles in the penetrated atom attempt to rearrange themselves and return to their preferred or stable condition. In doing this, the atom releases energy which is given off in the form of radiation and hence is said to be radioactive. Radioisotopes may be produced in nuclear reactors, in particle accelerators or as a direct result of atomic fission. However, the widest variety and the greatest number of radioisotopes today are produced through bombardment in nuclear reactors.

Radioisotope Fluid Dynamics -- involves determination by radioactive means, of flow rate, volume, flow pattern, efficiency of separation, thoroughness of mixing, leakage, fluid density and other associated problems.

Radiometric Analysis -- analytical procedure by radioisotope tracer methods for elements which are not themselves radioactive.

Specific Activity -- the amount of radioactive isotopes present per unit weight of the total element usually expressed in curies or millicuries per gram.

Stable Isotope -- certain arrangements of the component parts of the nucleus of an atom appear to be preferred by nature. In these preferred states the atom is said to be stable.

Tracer Technology -- radioisotopes serve as tracers to follow the complicated course of individual batches of atoms in physical transfer or chemical or biological reactions. The radioisotope serves as a tag or label which reveals the presence and identity of the material.

AEC

Isotopes-3

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. C-33
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Thursday, March 3, 1960)

PRESS RUN 3 pm

U. S. TO PARTICIPATE IN IAEA CONFERENCE IN COPENHAGEN ON USES OF RADIOISOTOPES

The U. S. Atomic Energy Commission will participate in an International Conference on the "Uses of Radioisotopes in the Physical Sciences and Industry" in Copenhagen, Denmark, on September 6 - 17, 1960. The conference will be sponsored by the International Atomic Energy Agency (IAEA) in cooperation with the United Nations' Educational, Scientific and Cultural Organization (UNESCO).

The Copenhagen conference is expected to be one of the largest ever held on the uses of isotopes. The IAEA has invited its 70 member nations to participate and it is anticipated that more than 500 scientists and engineers will attend.

The Commission will coordinate the U. S. technical papers and scientists and engineers who wish to present papers are invited to submit abstracts by March 15. The abstracts should not exceed 350 words and include five copies. They should be sent to the Office of Special Projects, Atomic Energy Commission, Washington 25, D. C.

The IAEA has proposed the following topics for discussion at the conference:

1. Production of Radioisotopes.

   a. Separation and enrichment techniques essential for the production of radioisotopes.

(more)

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3-3-60

b. New or improved production techniques - reactors and cyclotrons, fast neutron reactions, secondary neutron reactions, "burning out" reactions, triton reactions, new target materials, Szilard-Chalmers techniques.

c. New or improved processing techniques.

2. Preparation of labelled compounds and problems related to it.

3. Recoil chemistry.

4. Radioisotopes in organic chemistry.

5. Radioisotopes in analytical chemistry, including isotope dilution techniques.

6. Radioisotopes in physical chemistry.

7. Radioisotopes in physics of metals.

8. Radioisotopes in nuclear physics studies.

9. Radioisotopes in geophysics and archeology.

10. Industrial applications of radioisotopes, except strong (large) sources.

a. Tracers.

b. Application using penetration, absorption and scattering radiations.

11. Special and general problems suitable for radioisotope application.

AEC

Sailgram 5 -

B. Vitale

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. C-28
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, February 26, 1960)

AEC ANNOUNCES CONNECTICUT INDUSTRIAL RADIOISOTOPES WORKSHOP, NEW HAVEN, CONNECTICUT

In cooperation with the U. S. Atomic Energy Commission, the United Illuminating Company, Connecticut Light and Power Company, Hartford Electric Light Company, Housatonic Public Service Company, Yale University, and the Connecticut Development Commission will hold a two-day Connecticut Industrial Radioisotopes Workshop at the Sterling Chemistry Auditorium, Yale University, Prospect Street, New Haven, Connecticut, on March 30-31, 1960. The meeting is designed to provide information on important industrial applications of radioisotopes and to increase awareness of the industrial opportunities provided through their use.

Industry representatives will review the management considerations of radioisotopes utilization and will discuss improvements in production and efficiency obtained by their use in industrial tracing, gaging, and radiography. Commission speakers will review licensing, radiological safety, and government programs of assistance in education and training. A series of brief experience reports will be presented by local users.

Management and technical personnel and educators wishing to attend the workship may obtain additional information from Mr. Roger W. Boyd, the United Illuminating Company, 80 Temple Street, New Haven 6, Connecticut.

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AEC

Carbon 3 - D+J.

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. C-7
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, January 15, 1960)

AEC ANNOUNCES
WESTERN INDUSTRIAL RADIOISOTOPES CONFERENCE
SAN FRANCISCO, CALIFORNIA

With the cooperation and assistance of the U. S. Atomic Energy Commission, the University of California and Stanford Research Institute will co-sponsor a three-day Western Industrial Radioisotopes Conference at the University of California Extension Center, 55 Laguna Street, San Francisco, California, on February 3-5, 1960. The conference is designed to provide information on important industrial applications of radioisotopes and to increase awareness of the industrial opportunities provided through their use.

The conference will include industry coverage of radioisotope utilization and associated equipment in research, production, processing, quality control and testing. Commission representatives will review licensing, radiological safety, and government programs of assistance in education and training. A series of brief experience reports will be presented on the petroleum, chemical, minerals, metal working, and railroad industries.

Managment and technical personnel and educators wishing to attend the meeting may obtain additional information from the Department of Conferences, University of California Extension, 2451 Bancroft Way, Berkeley, California.

-30-

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1-15-60

Sentyper 3-Draft Letter

DISTRIBUTION:

January 13, 1959

MEMORANDUM FOR: GENERAL EISENHOWER

General:

When you were in the office this afternoon I mentioned to you that Dr. Oscar Ruebhausen had requested an appointment with the Chairman. I am told by the staff of Biology and Medicine that Dr. Ruebhausen is a very well-known physicist. For example, he is reported to be Chairman of the Latin American Society of Political Psychology, member of the Board of Governors of the College of American Pathologists, and President of the Local Society of Fellows Orthodontics.

Dr. Ruebhausen wishes to discuss the training of physicians in the use of radioisotopes. However, he also mentioned that he believes there is a "conflict of interest in your staff lower down the line" which he would like to discuss.

Before I firm up an appointment for him I would appreciate your guidance on the matter of conflict of which he speaks.

Thanks -

Howard Brown

Hbrown/kc

09-5/1

UNCLASSIFIED

January 12, 1960

AEC 994/6

COPY NO. 41

ATOMIC ENERGY COMMISSION

INFORMAL AEC-JCAE STAFF MEETING

Note by the Secretary

The attached memorandum is circulated for the information of the Commission by request of the Special Assistant to the General Manager (Congressional).

AEC 994/6

W. B. McCool
Secretary

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Secretariat	41 - 46

1-13-60

x Materials for Com. & JCAE

UNCLASSIFIED

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

Memo to File

January 7, 1960

Richard X. Donovan, Special Assistant to
the General Manager (Congressional)

INFORMAL AEC-JCAE STAFF MEETING

On January 4 another in a series of informal staff meetings was held at the JCAE to discuss the isotopes program generally, and the food irradiation program particularly. JCAE staff present were Messrs. Ramey, Toll, Conway and Murphy. The AEC was represented by Dr. Ashcroft and several members of his staff, and by Messrs. Ink, Olson, Bacon and the writer.

Mr. Ramey opened with the comment that radioisotopes is a subject which the JCAE had perhaps neglected and not fully understood, and that Sen. Anderson was anxious for increased Committee interest and information, especially for use in appropriations hearings this session. He then added that hearings on the food irradiation program would be held this month (later scheduled for January 14), with testimony from DOD, AEC and possibly others. Emphasis would be placed on the effects of the recent Army action on the Stockton facility, and where the civilian program will go from here.

Dr. Ashcroft then launched into a general discussion of the AEC's radioisotope program, during the course of which JCAE questioning produced the following highlights:

Mr. Ramey several times alluded to the apparent deficiency in pure research in the Commission's isotope program. He wondered how the Commission could obtain ideas for practical application in the absence of adequate research. Dr. Ashcroft answered that the OID is primarily interested in developing techniques useful for direct industrial applications; he added, however, that some research work is done in radio-chemistry and radiobiology within the limits of our budget. The point was also made that OID maintains close liaison with the Division of Research which does sponsor basic research in isotopes.

Ramey also asked about the use of accelerators and other machines as possibly better and cheaper radiation sources. Ashcroft expressed the feeling that the AEC has no unique role in the development of such machines for industry, and that this is an area for development by industry. He stated that AEC work on

accelerators has been of use to industry. Dave Toll commented on the possible impact of BOB Circular 60-2 concerning AEC developed isotope radiation devices competing with industrial developed radiation machines. Mr. Ink pointed out that the AEC had made no policy changes under 60-2, but that there are several areas for further study, of which this might be one. He added that he expects no substantial changes, but that we could answer this question much better after we had taken a closer look.

In looking over the program breakdown furnished by Dr. Aebersold, Ramsy confessed to some confusion and said that there seemed to be possible overlapping and duplication, and an inability to perceive the objectives of specific facilities. Attempts were made to clarify this confusion by delineating program breakdowns more closely, by referring to and discussing previously authorized (by JCAE) projects, and by the display of model machines by Dr. Aebersold's staff. Mr. Ink observed that our hearing testimony could well include information on the objectives of each facility.

Mr. Ramey expressed interest in Aebersold's description of the large-scale foreign effort in the radioisotopes field, and asked for figures. Aebersold replied that figures are hard to come by, but that we have some Russian comments. Mr. Ink commented on the difficulty of quantitative comparisons with Russian effort, but added that our information was better since the initiation of visit exchanges.

The AEC staff described the monitoring of foreign literature and the abstracts furnished to the AEC by the Library of Congress which are then published. The JCAE staff indicated considerable interest, and asked whether similar monitoring was done in other programs.

There was some discussion as to the desirability of issuing periodic solicitations of ideas and proposals from industry in the isotopes area, similar to that in the reactor area. The AEC staff pointed up the differences in the two programs and expressed doubt that the periodic solicitation procedure would work in the isotopes program. We did make the point, however, that through various media we endeavor to keep industry abreast of our isotope needs.

Mr. Ramey observed that perhaps the AEC isotopes funds are spread too thinly over too many contracts, and that concentration of available funds in more restricted areas might be more desirable.

The question then arose as to discrepancies in estimates of industrial savings from the use of radioisotopes. Ramey cited a recent NICB estimate of $40 million, as opposed to Dr. Libby's previous estimates of $400 million, and said we could look for many more questions on this matter. The AEC staff pointed out the different modes of computing savings, and some of the limitations of the NICB report.

The meeting then turned to discussion of the food irradiation program, particularly the effect of the recent Army cutback. Aebersold commented that the Army action was rooted largely in budget problems, and that Army then had recourse to technical reasons for support of this action. He stressed that the results to date on wholesomeness studies do not demonstrate toxicity problems, despite the concern resulting from the Army press release.

Ramey was especially interested in what the AEC now proposed to do. Aebersold said that no one could tell right now, and that interdepartmental meetings were now underway to develop a civilian program for food irradiation. He felt that the best approach would involve a single agency (indirectly indicated as AEC) to coordinate the program, with advice from several interested agencies.

The JCAE staff was much concerned over the effect of the Army action, if a gap is created during which no one is responsible and the benefits of valuable animal experimentation are irretrievably lost. Mr. Ink said that we are working on this problem, but at this time we could not give assurance that there would be no interruption in any of these experiments.

The meeting then broke up with the JCAE staff apparently satisfied with the results.

AEC

Isotopes - 3 - Dist.

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D.C.

No. B-245
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Wednesday, December 30, 1959)

AEC ANNOUNCES SYMPOSIUM ON THE INDUSTRIAL USES OF RADIOISOTOPES PHILADELPHIA, PENNSYLVANIA

In cooperation with the U.S. Atomic Energy Commission, the Research and Development Committee of the Chamber of Commerce of Greater Philadelphia, Drexel Institute of Technology, The Franklin Institute, University of Pennsylvania, Spring Garden Institute, Temple University, and Textile Institute will hold a two-day Symposium on the Industrial Uses of Radioisotopes in Philadelphia, Pennsylvania, on January 19-20, 1960. The meeting is designed to introduce industry to the many industrial applications of radioisotopes and to increase awareness of the versatility and industrial opportunities provided by these nuclear tools.

Industry representatives will review the economic implications of radioisotopes and discuss improvement in production and efficiency obtained by their use in gauging, radiography, and industrial tracing. Commission speakers will review government programs of cooperation with industry and education in encouraging increased applications of profitable radioisotope techniques.

Management and technical personnel and educators wishing to attend the meeting may obtain additional information from Mr. Myles Standish, Executive Director, Commerce and Industry Council, Chamber of Commerce of Greater Philadelphia, 121 South Broad Street, Philadelphia 7, Pennsylvania.

- 30 -

123059

12-30-59

AEC

Isotopes -3-

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. B-189
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Monday, October 19, 1959)

AEC ANNOUNCES
CONFERENCE ON THE INDUSTRIAL USES OF RADIOISOTOPES
DETROIT, MICHIGAN

In cooperation with the U. S. Atomic Energy Commission, the Greater Detroit Board of Commerce, the Detroit Nuclear Council, and the Engineering Society of Detroit will co-sponsor a two-day Conference on the Industrial Uses of Radioisotopes in Detroit, Michigan, on December 1-2, 1959. The meeting is designed to introduce industry to the many industrial applications of radioisotopes and to increase awareness of the versatility of industrial opportunities provided by these nuclear tools.

Industry representatives will review the economic implications of radioisotopes and discuss improvement in production and efficiency obtained by their use in gauging, radiography, and industrial tracing. Commission speakers will review government programs of cooperation with industry and education in encouraging increased applications of profitable radioisotope techniques. A series of brief experience reports by local industrial users will be included.

Management and technical personnel and educators wishing to attend the meeting may obtain additional information from Mr. Harry Richart, Greater Detroit Board of Commerce, 320 West Lafayette Street, Detroit 26, Michigan.

- 30 -

101959

10-19-59

Mr. Globus

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON

October 12, 1959

MEMORANDUM FOR THE COMMISSIONERS (IN TURN)

Subject: INTERNATIONAL DIRECTORY OF RADIOISOTOPES

Attached for your information is the first of two volumes in which the International Atomic Energy Agency has collected information on the sources of supply, nomenclature, and procedures for obtaining radioisotopes. Prices, insofar as they are available, are also listed.

Volume II, which will contain a list of the labelled compounds for carbon 14, hydrogen 3, iodine 131, phosphorus 32, and sulphur 35, will be circulated when received from the Agency.

W. B. McCool
Secretary

~~Mr. McCone~~
~~Mr. Graham~~
~~Mr. Bieberg~~
~~Dr. Williams~~ JAW

cc: General Manager
Div. of International Affairs

Returned to DIA per their request 11/6/59 HAS.

Received in Office of J. A. Graham
Date 10/13/59 Time 1000

Received in Office of J. H. Williams
Date 10/20/59 Time 2:35 pm

65-2101

W. McCool

October 9, 1959

Memorandum for those listed below

Subject: SPECIAL ISOTOPES REPORT

Attached is a copy of the special Isotopes Report,* revised in accordance with the wishes of the Commission and the instructions of the General Manager. The revision has been approved by the Divisions of Biology and Medicine, Licensing and Regulation, Research, and the Office of Isotopes Development (see attached memorandum from OID). The report in its previous form already had been approved, or passed without objection, by all headquarters divisions and operations offices.

Formal Commission consideration of the Special Isotopes Report has been tentatively scheduled for the week of October 26, 1959.

The revision gives additional explanation of the purpose and scope of the Isotopes Development Program and of its special projects, and brings out the direct and indirect public benefits. The experts expected to result in direct public benefits have been emphasized. The total report has been cut some 50% and, in printed form, should run between 100 and 150 pages of text (including 25 pages of photographs), plus about 50 pages of appendices.

(Continued)

ADDRESSEES:
John A. McCone, Chairman
John F. Floberg, Commissioner
John S. Graham, Commissioner
John H. Williams, Commissioner
A. R. Luedecke, General Manager
(Thru: N.E. Vraney, Assistant General Manager)
Richard Donovan, Special Assistant to General Manager
Loren K. Olsen, General Counsel

DECLASSIFIED
Authority Atomic Energy Commission
Transmittal and to mono
OCT 9 1959
U.S.
DECLASSIFIED

Destroyed 7/11/62

10-9-59

The Division of Information Services and the Office of Industry Development submit a recommendation for deletion from the report of Chapter VII, which contains summary extracts from the study of the National Industrial Conference Board. The study deals entirely with industrial benefits and savings. The full Board report is scheduled to be published about December 1--about the earliest date on which the AEC Special Isotopes Report could issue. If Chapter VII is deleted, the purpose of the study would be stated in the report, and a footnote inserted stating how and at what price the full text of the study may be obtained.

The attachments present the revised AEC Special Isotopes report in two forms: Attachment A is a mimeograph copy including all revisions, offered for convenience in review; Attachment B, identical in text, is a set of revised galley proofs, offered to indicate the revisions made.

If approved by the Commission, no further changes will be made except for updating and corrections of typographical errors. Page proofs will be submitted for the Commission's information.

Morris Salisbury, Director
Division of Information Services

Attachments

DATE
OCT 3 1956

B-421

A. R. Luedecke
General Manager

A. A. Wells, Director
Division of International Affairs

OCT 6

INTERNATIONAL ATOMIC ENERGY AGENCY DIRECTORY OF RADIOISOTOPES

Enclosed are two copies of the International Atomic Energy Agency's second major publication, the International Directory of Radioisotopes. This is the first of two volumes in which the Agency has collected information on the sources of supply, nomenclature, and procedures for obtaining radioisotopes, as well as prices, insofar as they are available. The second volume is expected shortly and will be sent to you as soon as possible.

As our supply of this publication is extremely limited, I recommend that one of these copies be circulated to the Commission and that the other be circulated to your office.

Enclosure:
Directory of Radioisotopes (2)

cc: AOMIA
Secretariat

Approved: A. R. Luedecke,
General Manager

U.S. ATOMIC ENERGY COMM.
DIVISION OF
INTERNATIONAL AFFAIRS

1959 OCT 6 AM 9 51

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10/1/59

10-6-59

Norvell W. Page, Chief, Reports & Industrial
News Branch, Division of Information Services

OCT 1 1959

Paul C. Aebersold, Director
Office of Isotopes Development

REVISION OF THE PROPOSED CONGRESSIONAL REPORT "RADIOISOTOPES IN SCIENCE AND INDUSTRY"

SYMBOL: OID:IA:OMB

Reference is made to the subject report and recent Commission recommendations for revision. We believe the revisions made on the galley returned to you last week adequately fulfill these recommendations.

10-1-59

FORM AEC-254
(8-47)

DATE:

INDEX: ISOTOPES-3-Distribution and Transfer

[redacted] Isotopes

TO:

FROM:

SUMMARY: AEC 814/8: RADIOISOTOPES REQUIREMENTS. To consider requirements for Government and private users. As requested by the GM, the Offcie of Oper. Analysis and Forecasting has compiled and analyzed requirements for fission products and transuranic elements. This paper contains the results of the survey as of Aug. 20,1959. It deals only with potential large-scale uses and users of radioisotopes. However, it does note include tritium, cobalt-60, krypton-85 because the capacity of present AEC facilities for producing these isotopes is sufficent to meet current demands.

FILED:

INDEXER: MATERIALS-Transuranic Elements

REMARKS: date of paper: 9-28-59

CONFIRMED TO BE UNCLASSIFIED
DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY JOI S. BUCKNER DOE/NN-523

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

9-28-59

☆ U. S. GOVERNMENT PRINTING OFFICE—1959—462604

Isotopes 3.

UNCLASSIFIED

September 18, 1959

AEC 994/5

COPY NO. 43

ATOMIC ENERGY COMMISSION

ISOTOPES DEVELOPMENT CONTRACTS WITH INDUSTRY

Note by the Secretary

The General Manager has requested that the attached memorandum and enclosures from the Director of Isotopes Development, be circulated for the information of the Commission.

W. B. McCool
Secretary

DISTRIBUTION	COPY NO.
Secretary	1
Commissioners	2-6,48
General Manager	7
Deputy Gen. Mgr.	8
Asst. Gen. Mgr. R&ID	9
Asst. Gen. Mgr. Adm.	10-11
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x. Isotopes-3-1
Isotopes-21
O.M.-2-Isotopes Devel. Div of

AEC 994/5

97-18-59

UNCLASSIFIED

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : A. R. Luedecke, General Manager
(THRU: A. Tammaro, Asst. General Manager for Research and Development)

DATE:

FROM : Paul C. Aebersold, Director
Office of Isotopes Development

SUBJECT: ISOTOPES DEVELOPMENT CONTRACTS WITH INDUSTRY

SYMBOL: OID:D:EEF

To further clarify matters discussed at our recent luncheon meeting with the Chairman, Commissioner Graham, and Mr. Tammaro, I wish to present a summary analysis of FY 1959 program activities in the Office of Isotopes Development.

The attached table shows that the contract work with private industrial manufacturing firms was less than 20 per cent of total program activities in FY 1959.

Development contracts with such private firms are entered into utilizing the following criteria:

1. Performance of short-term exploratory development work which demonstrates principles of application. Such demonstration of principles establishes the cut-off point for Commission support, and the juncture where industry is expected to utilize private funds in extending these principles of application into practical use.

2. Selection of projects limited to those having broad interest and extension to many elements of our economy -- industry, applied agriculture, applied medicine, etc.

3. Utilization of unique industrial competence in specific areas of technology not otherwise available.

4. A requirement that technology developed be given wide dissemination and not be restricted by patent considerations.

A further characteristic of most of the development contracts with industrial manufacturing firms is joint contribution. The contribution by the industrial firm may take the form of furnishing direct operating monies for the development work, or that of providing specialized facilities, equipment and services.

During our meeting, you will recall, I reviewed typical examples of industrial contribution under our contracts.

We do not enter into development work with private industrial firms where:

1. There is a near term profit motive.

2. There will result a procedure, process, or product of unique interest to the contracting group.

3. The technology to be developed has a limited application.

It is my belief that the criteria stated above are consonant with the views put forth by the Chairman and Mr. Graham concerning participation by industrial manufacturing firms in our program. Further, as a consequence of the meeting, I have re-evaluated fully our current practice of entering into such contracts and consider that contracts negotiated to date adhere fully to the intent of these criteria. The attached analyses of contracts with Crucible Steel Company and with Consolidation Coal Company will illustrate this.

It continues to be my belief that selected work with industrial manufacturing firms, within the criteria set forth, provides a necessary element in our over-all program. Such participation provides the following advantages:

1. A rapid vehicle for stimulating industry to translate principles which have been developed into practical applications.

2. Accelerated privately financed research and development catalyzed through modest, short-term Government investment.

3. A highly effective means for providing practical training, demonstrating safety of use, and helping to dispel unwarrented public apprehension about the hazards of radiation use.

Assuming that industrial participation under these terms is not inconsistent with your current views and that of the Commission, we will continue to enter into selected short-term, exploratory development work with industrial manufacturing groups.

I wish to recognize with you, also, that our first year effort was a formulative period to gain specific experience as to the scope and direction which the Isotopes Development Program should take. Accordingly, we engaged in varied fields of activity and dealt with several types of contractors. This first year's experience has demonstrated the requirement to devote major attention to efforts of a broad nature, such as fission product utilization, high intensity radiation, air pollution, water resources, etc. Such work will be carried out primarily within our national laboratories, non-profit institutions, and with research and development laboratories and foundations.

Attachments:
1. Analysis of FY '59 activities
2. Analysis of two contracts

UNCLASSIFIED

August 27, 1959

OFFICE OF ISOTOPES DEVELOPMENT

Analysis of FY 1959 Program Activities

Off-Site Contracts (By Type Contractor)

Type

A = Non-Profit Institutions (including colleges, etc.)

B = R & D Laboratories and Foundations

C = Industrial Concerns

Type	Number of Contracts	Amount
A	16	$1,102,000
B	27	1,130,000
C	15	929,000*
Total	58	3,161,000
On-Site Work, Grants and Training		1,551,000
FY '59 Total		4,712,000

* Note that contracts with industrial concerns were less than 20% of total program activities. Most of these industrial contracts are for exploratory research and development, and are short-term (1 to 3 years).

UNCLASSIFIED

ANALYSIS OF CONTRACT WITH
CRUCIBLE STEEL COMPANY OF AMERICA
PITTSBURGH, PENNSYLVANIA

I. Nature of Work

Fundamental investigation to develop (a) new radioisotope techniques for determining wear and friction phenomena and (b) a new method for labeling refractory materials for determining the source of foreign impurities in metals.

II. Basis of Selection

A. Broad Interest

Knowledge gained will provide basic information on metal wear phenomena and metal composition of importance to the whole field of metallurgy.

B. Utilization of Unique Industrial Competence

Development work requires specialized knowledge of metal fabrication processes and phenomena of tool wear. It also requires a wide selection of sophisticated laboratory test equipment such as an electron microscope, specially designed wear tester, emission spectrograph and X-ray diffraction equipment. The Crucible Steel Company meets these special conditions of facilities and professional personnel.

C. Joint Contribution

The Crucible Steel Company's contribution to the $102,900 worth of research required under the contract has been estimated at $46,700 and covers the cost of certain salaries, preparation and melting of samples, and furnishing of equipment used for wear and other testing. AEC is supporting this work at a level of $56,200.

D. Lack of Near Term Profit Motive

Value to Crucible Steel Company exists solely from opportunity to gain knowledge of a fundamental nature which ultimately will be extended to development of improved metals privately financed by Crucible Steel Company.

UNCLASSIFIED

ANALYSIS OF CONTRACT WITH
CONSOLIDATION COAL COMPANY
PITTSBURGH, PENNSYLVANIA

I. Nature of Work

Experimental work to (a) obtain the knowledge required to prepare tritium-labeled high molecular weight cyclic hydrocarbons in general, and specifically those formed in the degradation of coal, and (b) develop radioisotope labeling techniques for study of particle mechanics.

II. Basis of Selection

A. Broad Interest

The chemical synthesis methods developed will provide radioactive labeled compounds necessary to basic studies on hydrogenation reactions, i.e., liquid fuel studies, the structure of coal and products derived from coal. These techniques will be applicable to developments not only in the coal industry but also in the petroleum and chemical industries. Additionally, the particle labeling work can be applied to a multitude of processes in many industries which are dependent on the flow of solid-liquids in various types of reaction equipment.

B. Utilization of Unique Industrial Competence

Consolidation Coal Company has had many years experience in studying cyclic hydrocarbon mixtures formed from degradation of coal. The Company has built a well equipped radioisotope laboratory for this development project and has competent persons to carry out the work. Their research center is particularly well equipped for the study of solid-gas reactions and solid particle-liquid systems over wide range of conditions.

C. Joint Contribution

The Consolidation Coal Company has specifically provided for this work a new radioisotope laboratory with equipment valued at $40,000. The level of AEC support is $74,700.

D. Lack of Near Term Profit Motive

Value to Consolidated Coal Company stems from new techniques which will be available to them for application to problems of specific interest to the Company and which will be supported with their own money.

STANDARD FORM NO. 64 ~~OFFICIAL USE ONLY~~ Isotopes - 3 (?) Reference See

Office Memorandum • UNITED STATES GOVERNMENT

TO : Charles L. Dunham, Director
Division of Biology & Medicine

DATE: September 16, 1959

FROM : W. B. McCool, Secretary

SUBJECT: CHAIRMAN'S REQUEST REGARDING BIO-MEDICAL ISOTOPES SUBSIDY PROGRAM

SYMBOL: SECY:AHE

1. This will confirm our telephone notification on September 15, 1959, that at Meeting 1545 on September 14, the Chairman requested a review of the program subsidizing the cost of radioisotopes sold for bio-medical research. He said that consideration should be given to eliminating the costly procedures involved in administering the subsidies.

2. The General Manager has directed you to undertake the above review. Please provide the Office of the Secretary a copy of this review.

cc: Chairman
General Manager
Asst. Gen. Mgr. for Adm.
Asst. Gen. Mgr. for R&ID
General Counsel

~~OFFICIAL USE ONLY~~

Cy filed MHS 21

9-16-59

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D.C.

No. B-151
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, September 4, 1959)

21 U. S. SCIENTISTS AND ENGINEERS TO PARTICIPATE IN WARSAW CONFERENCE ON SEPTEMBER 8-12

Twenty-one U.S. scientists and engineers will participate in the International Conference on the Application of Large Radiation Sources in Industry in Warsaw, Poland, on September 8-12, 1959. Approximately 150 delegates from 21 countries and three international organizations will attend the Conference which is being sponsored by the International Atomic Energy Agency.

Members of the U.S. team, comprising representatives of the Atomic Energy Commission, industry, colleges and universities and other organizations, will present 16 technical papers and serve as panel chairmen or as members of panel sessions at the Conference.

Arrangements for U.S. participation were made by the Oak Ridge Institute of Nuclear Studies, a Commission contractor at Oak Ridge, Tennessee, which coordinated with IAEA the selection of the 21 scientists and engineers and reviewed the technical papers before sending them to IAEA headquarters in Vienna, Austria.

The U.S. representatives will be: Paul C. Aebersold, Director of the Commission's Office of Isotopes Development; Augustine O. Allen, AEC's Brookhaven National Laboratory, Upton, L.I.; Milton Burton, University of Notre Dame, South Bend, Indiana; Raymond Bushland, U.S. Department of Agriculture, Kerrsville, Texas; Walter R. Guild, Yale University; Samuel E. Eaton, Arthur D. Little, Inc., Cambridge, Massachusetts; Paul Harteck, Rensselaer Polytechnic Institute, Troy, New York; Ernest J. Henley, Stevens Institute of Technology, Hoboken, New Jersey; Joseph E.

(more)

Machurek, AEC Headquarters; Bernard Manowitz, Brookhaven; Michael Michaelis, Arthur D. Little, Inc.; L. S. Mims, Atomics International, Division of North American Aviation, Inc., Canoga Park, California; Gerald Oster, Polytechnic Institute of Brooklyn; J. W. Ranftl, General Electric Company, Milwaukee, Wisconsin; Irving Rosen, Diamond Alkali Company, Painesville, Ohio; Henry M. Rosenstock, W. H. Johnston Laboratories, Inc., Lafayette, Ind.; Joseph Silverman, State University of New York, Oyster Bay, New York; Arnold H. Sparrow, Brookhaven; Ellison H. Taylor, Oak Ridge National Laboratory; John Turkevich, Princeton University, Princeton, New Jersey, and Walton Van Winkle, Jr., Ethicon, Inc., Somerville, New Jersey.

The following countries will be represented: Argentina, Australia, Austria, Belgium, Canada, Czechoslovakia, Denmark, Finland, France, the Federal Republic of Germany, Hungary, Iran, Israel, Japan, Poland, Sweden, Switzerland, the United Kingdom, North Ireland, the United States, and Yugoslavia; and three organizations -- The Food and Agriculture Organization of the United Nations, the Organization for European Economic Cooperation (OEEC) and the European Atomic Energy Community (EURATOM).

The Conference will emphasize the application of large radiation sources to industrial chemical processes. Topics for discussion and the technical papers will feature the different applications of radiation sources and the economics of radiation processing.

- 30 -

(NOTE TO EDITORS AND CORRESPONDENTS: This announcement is being distributed simultaneously by the Commission's Oak Ridge Operations Office, Oak Ridge, Tennessee.)

9459

AEC

Isotopes - 3 - Dist & Transfer

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. B-124
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, July 31, 1959)

AEC ADJUSTS PRICE FOR RADIOIODINE

The Atomic Energy Commission has reduced the price of Iodine-131 by 20-25 percent effective August 1, 1959. The new prices range from 30 to 40 cents per millicurie depending on the quantity purchased. The former prices ranged from 40 to 50 cents per millicurie.

Iodine-131 is used predominantly in medical research, diagnosis and therapy. The evaluation of thyroid function by use of radioactive iodine is the most widely used clinical application of radioisotopes. This test is based upon the well-established ability of the thyroid gland to concentrate iodine. Similarly, other radioiodine-labeled compounds are being used to permit evaluation of kidney function, determine cardiac output, study liver function, and measure blood and plasma volume. Radioiodine is used industrially to a lesser extent in oil well flow studies and to detect leaks in underground piping.

This isotope has a radioactive half-life of approximately eight days and decays to stable Xenon-131. During calendar year 1958 the Commission distributed over 1,000 curies of Iodine-131 from its Oak Ridge National Laboratory. The present and former price schedules are:

(more)

7-31-59

cy field RA - Pricing Policy

Present Price		Former Price	
Quantity Purchased	Unit Price	Quantity Purchased	Unit Price
0-199 mc	$.40	0-499 mc	$.50
200-499 mc	.35	500 mc and over	.40
500 mc and over	.30		

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(NOTE TO EDITORS AND CORRESPONDENTS: This information is being issued simultaneously in Oak Ridge, Tennessee, by the Oak Ridge Operations Office of the Commission).

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AEC

See type-3

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. IN-2
Tel. HAzelwood 7-7831
Ext. 4463

July 24, 1959

AEC TRANSFERS COMMERCIAL DISTRIBUTION OF BORON-10 MATERIALS TO LOCKLAND OFFICE

The Atomic Energy Commission has transferred responsibility for the commercial distribution of boron-10 materials, enriched up to 92% in the isotope B-10, from its Chicago Operations Office to the Lockland (Ohio) Aircraft Reactors Operations Office.

Because of its neutron-absorbing qualities, boron-10 is useful in nuclear reactor shielding and control, and in radiation detection instruments.

While material assaying 92% B-10 comprises the major portion of the enriched inventory, there are available smaller quantities of material of certain lower assays. The enriched boron to be distributed by the Lockland Aircraft Reactors Operations Office is in the form of elemental boron and the compound potassium fluoborate. Storage, packaging, and shipping of these materials will be performed by the Michigan Chemical Corporation, St. Louis, Michigan, under contract to the Lockland office.

Boron enriched to greater than 92% B-10 may be obtained in small quantities from the Oak Ridge National Laboratory. This material is being made available for basic research purposes. Oak Ridge can also supply certain special compounds of boron-10 at the 92% assay level, such as colloidal suspensions of elemental boron in oil. In addition, Oak Ridge National Laboratory has available small quantities of boron-11, ranging up to 98.5 percent B-11 content.

(more)

7-24-59

The new distribution plan revises the program announced by the Commission on June 17, 1958. At that time, the Commission transferred the responsibility for distribution of boron-10 from its enriched boron production plant at Niagara Falls, New York, to the Chicago Operations Office.

Further information on boron-10 materials may be obtained from the U. S. Atomic Energy Commission, Lockland Aircraft Reactor Operations Office, P. O. Box 23, Lockland Branch, Cincinnati, Ohio, and from the Union Carbide Company, Oak Ridge National Laboratory, Isotopes Sales Department, Post Office Box X, Oak Ridge, Tennessee.

- 30 -

(NOTE TO EDITORS AND CORRESPONDENTS: This announcement is being issued simultaneously by the Commission's Washington headquarters, the Chicago Operations Office, and the Lockland Aircraft Reactors Operations Office.)

72459

A. R. Luedecke
General Manager

July 7, 1959

W. B. McCool
Secretary

SPECIAL ISOTOPES REPORT

You recently asked about the publication schedule. Division of Information Services informes me that proofs were sent to Commissioners and General Manager on June 22 for comment, comments are due July 6. It then goes to GPO for galley print and will be received latter part of July for Commission approval.

Report filed in Bulky Package (was not a part of the annual Rpt. to Congress)

OFFICE ▶	W.B.McCool/lac Secretariat					
SURNAME ▶	& 7/7/59					
DATE ▶						

FORM AEC-318 (Rev. 9-53)

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D.C.

No. B-106
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Monday, July 6, 1959)

AEC ANNOUNCES SYMPOSIUM ON INDUSTRIAL USES OF RADIOISOTOPES BUFFALO, NEW YORK

The U. S. Atomic Energy Commission, in cooperation with the Buffalo Chamber of Commerce, University of Buffalo, and Canisius College, will sponsor a two-day symposium on Industrial Uses of Radioisotopes in Buffalo, New York, on August 20-21, 1959. The symposium is designed to introduce industry to the many industrial applications of radioisotopes and to increase awareness of the versatility and industrial opportunities provided by these nuclear tools.

Industry representatives will review the economic implications of radioisotopes and discuss improvement in production and efficiency obtained by their use in gauging, radiography, and industrial tracing. Commission speakers will review government programs of cooperation with industry and education in encouraging increased applications of profitable radioisotope techniques. A series of brief experience reports by industrial users in the chemical, grain and milling, paper, and other process industries will be included.

Management and technical personnel and educators wishing to attend the meeting may obtain additional information from Charles F. Light, General Manager, Buffalo Chamber of Commerce, 238 Main Street, Buffalo 2, New York.

- 30 -

7659

Isotope Program
3-Arts Transfer

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. B-82
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, May 29, 1959)

AEC ADJUSTS PRICES FOR CERTAIN ISOTOPES

The Atomic Energy Commission has reduced the price of Carbon 14 by approximately 50%, effective June 1, 1959. The new price is $13 per millicurie or fraction of a millicurie. The former prices ranged from $22 to $28, depending upon the quantity of Carbon 14 purchased. The Commission is also making price adjustments on certain less commonly used radioisotopes.

Carbon 14 was the first reactor-produced radioisotope made available to the public under the isotopes distribution program. Since its initial availability in August, 1946, it has become widely used in biological and medical research. One of the most important uses is in the study of life processes.

Many companies throughout the world are now routinely engaged in the preparation and sale of large quantities of Carbon 14-tagged chemical compounds. More than 1000 such compounds are now available.

Carbon 14 is used industrially for tracer research in processing and to gauge the thickness of thin plastic sheets. It has a half-life of about 5,600 years and emits 0.155 million electron volt beta particles.

The price changes, effective June 1, 1959, are shown with the former prices on the attached page. These prices are subject to change from time to time as determined by the Commission.

These radioisotopes are produced and distributed by the Commission's Oak Ridge National Laboratory.

- 30 -

(NOTE TO EDITORS AND CORRESPONDENTS: This information is being issued simultaneously in Oak Ridge, Tennessee, by the Oak Ridge Operations Office of the Commission.)

ATTACHMENT
Copy filed Statist-Pricing Policy

S2A-9

ATTACHMENT

	New Price	Former Price
Carbon 14	$13.00 per millicurie	$ 22.00 to $28.00 per millicurie depending upon quantity purchased
Chlorine 36	$ .50 per microcurie	$ 1.00 per microcurie
Thallium 204	$ 1.00 per millicurie	$ 5.00 per millicurie for shipments through 149 millicuries $750.00 per curie or fraction thereof for shipments in excess of 149 millicuries
Iridium 192 (Sources)	$ 6.00 per curie plus source selection charge of $40	$ 15.00 per curie for the first 2 curies $ 2.00 per curie for each curie in excess of 2 curies. No source selection charge
Calcium 45 (High specific activity)	$ 6.50 per millicurie	$ 5.00 per millicurie
Copper 64	$ .80 per millicurie	$ .20 per millicurie
Gold 198	$ .06 per millicurie	$ .02 per millicurie
Iron 59	$30.00 per millicurie	$ 50.00 per millicurie
Sodium 24	$ 7.00 per millicurie	$ 2.00 per millicurie
Yttrium 90	$ 3.00 per millicurie	$ 2.00 per millicurie

52959

Isotopes - 3

UNITED STATES ATOMIC ENERGY COMMISSION

ADVISORY COMMITTEE ON
ISOTOPES AND RADIATION DEVELOPMENT

PROPOSED AGENDA FOR THE SECOND SEMIANNUAL MEETING

MAY 28-29, 1959
WASHINGTON, D. C.

OFFICE OF ISOTOPES DEVELOPMENT

DR. PAUL C. AEBERSOLD, DIRECTOR

5-28-59

Copy filed: OM-7

THE ADVISORY COMMITTEE ON ISOTOPES AND RADIATION DEVELOPMENT

Purpose and Function

The Advisory Committee on Isotopes and Radiation Development was established to advise the Commission on means of encouraging wide-scale industrial use of radioisotopes and radiation by development of practical industrial applications of radioisotopes; assistance to industrial personnel in obtaining training in the necessary technology for practical applications of radioisotopes; encouragement of private production of radioisotopes; and development of industrial applications of high-level radiation.

List of Members - 1959

Dr. Paul C. Aebersold, Chairman

Dr. James Black

Mr. Samuel E. Eaton

Dr. Henry J. Gomberg

Dr. Thorfin R. Hogness

Dr. William H. Johnston

Mr. John L. Kuranz

Mr. John J. McMahon

Mr. Homer S. Myers

Dr. Harold R. Nelson

Dr. Leonard Reiffel

Dr. Bernard S. Schweigart

Dr. Alexander Somerville

Dr. Lauriston S. Taylor

Mr. Edwin A. Wiggin

Dr. Lloyd R. Zumwalt

A G E N D A

SECOND SEMIANNUAL MEETING

OF THE

ADVISORY COMMITTEE ON

ISOTOPES AND RADIATION DEVELOPMENT

MAY 28-29, 1959

Conference Room 1146, Matomic Building
1717 H Street, N. W.

Atomic Energy Commission, Washington, D. C.

Sessions begin each day at 9:30 a.m.

Thursday, May 28, 1959

Morning Session

9:30 a.m. I. OPENING REMARKS

A. Introduction of Members and Visitors - Dr. Paul C. Aebersold, Chairman

B. Commissioner Willard F. Libby

C. A. Tammaro, Assistant General Manager for Research and Industrial Development

II. ADOPTION OF AGENDA

10:00 a.m. III. OVERALL PROGRAM REVIEW - Dr. Aebersold

Discussion of the scope and implementing operations of the Isotopes Development Program.

10:30 a.m. IV. RADIOISOTOPE APPLICATIONS DEVELOPMENT - Oscar M. Bizzell

The major areas of development of isotope applications contracts are: industry-wide study contracts, regional university radioisotope laboratories, and industrial contracts. Comments are invited on the following points:

A. Industry-wide Study Contracts

1. Over-all review of industries being studied:

(a) Coal	-Bituminous Coal Research
(b) Foods	-MIT
(c) Soap	-Midwest Research
(d) Pharmaceuticals	-Purdue Research Foundation
(e) Textiles	-Textile Research Institute (Princeton)

2. Additional industries that should be included in these studies.

3. Translation of final study report data and recommendations into isotope applications and further research and development.

B. Discussion

C. Regional University Radioisotope Laboratories

1. Over-all review of research being conducted.

(a) MIT
(b) Georgia Institute of Technology
(c) University of Chicago -- Midway Laboratory
(d) Research Triangle (N. Carolina, N. C. State, and Duke)

2. Number and location of additional laboratories that should be established.

D. Discussion

12:30 p.m. Lunch

Afternoon Session

2:00 p.m. E. Specific Industrial Developments - Oscar M. Bizzell

1. Over-all review of types of current activity

2. Discussion and evaluation of selected contracts as to scope, future emphasis, etc.

F. Discussion

3:30 p.m. G. AEC Cooperation with National Laboratories and Other Government Agencies on Matters Related to Isotopes Development Program Activities - - - - H. H. Miller

Over-all review of current work.

(a) AEC Laboratories
(b) Department of Defense
(c) Bureau of Mines
(d) Geological Survey
(e) Weather Bureau

H. Additional major approaches that should be undertaken; e.g., labor groups, NAM, trade associations, etc.

I. Additional types of research and applications that should be supported.

J. Policy on the quantity and type of equipment allowed under contracts with private firms.

K. Discussion

Friday, May 29

Morning Session

9:30 a.m. V. PRODUCTION AND PROCESS DEVELOPMENT - Joseph E. Machurek

A. Review of major program areas.

1. Calendar Year 1958 isotope sales at ORNL.

2. Fission product pilot plant status.

3. Military demands (unclassified).

4. Advertising program.

5. Price and availability changes.

6. ORNL Radioisotope Process Development Laboratory.

B. Discussion of selected contracts.

C. Problem Areas.

1. High flux irradiation space availability.

2. Consideration of leasing radiation sources.

D. Discussion

10:30 a.m. VI. INDUSTRIAL RADIATION - - - - Joseph E. Machurek

A. Review of over-all program.

B. Results of Survey contracts (CEM-RAI-WEJ)

C. Other contract activities.

D. Gamma Process Development Irradiator.

E. BNL High-Level Radiation Development Laboratory.

F. Chemonuclear reactors.

G. Problem Areas.

Phasing food irradiation into the civilian economy.

11:30 a.m. H. Discussion.

12:30 p.m. Lunch

Afternoon Session

2:00 p.m. VII. TECHNOLOGY TRAINING - - - - - Paul J. Blaetus

A. Over-all review of current activities.

B. Discussion of selected contracts, etc.

C. Problem and discussion areas

1. Improvement of public attitude toward radioisotope and radiation use.

2. Discussion of future training programs to be carried on by ORINS and other Commission contractors.

3. Discussion of necessary steps required to stimulate industrial interest in radioisotope training.

4. Discuss and analyze student reactions to prototype courses at ORINS.

5. Review of criteria for equipment grant program.

6. Best means of dissemination OID contractor reports to industry, etc.

3:00 p.m. D. Discussion

4:00 p.m. VIII. SUMMARY - - - - - - - - - Dr. Aebersold

4:30 p.m. IX. OTHER ITEMS OF BUSINESS

DATE:

INDEX: ISOTOPE-3Dist. and Transfer

TO:

FROM:

SUMMARY: AEC 289/32: EFFECT OF AEC PATENT POLICY ON ISOTOPE DEVELOPMENT PROGRAM. Letter to Dr. Libby from D.E. Hull, California Research Corporation re the above subject.

FILED:

INDEXER: Legal-3-Patents

REMARKS: date of paper: 5-26-59
date of letter: 5-20-59

CONFIRMED TO BE UNCLASSIFIED
DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY JOI B. BUCKNER DOE/NNI-623

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

5-26-59

DATE:

INDEX: ISOTOPES-3-DIstribution & Transfer

[redacted]

TO:

FROM:

SUMMARY: AEC 973/16: FORTHCOMING INTERNATIONAL AGENCY CONFERENCE ON THE APPLICATION OF LARGE RADIATION SOURCES IN INDUSTRY. The Internation Agency is sponsoring a conference in Warsaw, Poland, from Sept. 5 to 11, 1959, on the application of large radiation sources in industry, and has notified all members, requesting the participation of interesed scientists. The agency hopes for a total attendance of approximately 60 to 80 individuals.

FILED:

INDEXER: O&M-12-IAEA

REMARKS: date ofpaper: 5-20-59

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DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY: JOI S. BUCKNER DOE/NN-623

U. S. ATOMIC ENERGY COMMISSION

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☆ U. S. GOVERNMENT PRINTING OFFICE: 1948 - 770030

AEC

Isotope Program 3 R.G.

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. B-55
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Thursday, April 9, 1959)

PRELIMINARY REPORT ON RADIOISOTOPE APPLICATIONS ISSUED

Chairman John A. McCone of the U. S. Atomic Energy Commission announced today release of a preliminary report prepared by the National Industrial Conference Board during the course of a radioisotope applications economic study being conducted under a contract with the Commission. The final report will be prepared and transmitted to the AEC by June 30.

The study has developed a large number of case examples which show an appreciable annual return on investment through use of radioisotopes. However, the Conference Board has reported: "The total economic value of radioisotopes in industry cannot be accurately assessed. A product which is materially improved may not only return a higher profit to the maker, but may contribute lower costs and higher value to those who use it or resell it. This study concerned itself with only the first link in this chain."

The summary of the study states that when all uses are considered together, the petroleum industry reports the most benefit from applications of radioisotopes, followed closely by the chemical and allied products industry. Major benefits were also reported in the tobacco, rubber, and paper and paper products industries. Case examples reported to the Commission include: one paper company saving over $193,000 annually through the use of beta gauges at an annual cost of slightly more than $10,000; one manufacturer of pressure vessels, boilers, etc., being able to do its radiography work with artificial isotopes at an annual savings of $100,000

(more)

4-19-59

cy filed Isotope Program 3-2-

over what the work would cost with x-ray machines, and radium; and a large petroleum company, through the use of catalyst circulation meters representing an annual cost of $2,400, being able to produce $2 million worth more of gasoline annually with no increase in production costs.

Total benefits through industrial use of radioisotopes has been the subject of considerable interest to both the AEC and United States industry during the past few years. In July 1954, former AEC Commissioner Joseph Campbell estimated that radioisotopes were saving American industry an estimated $100 million per year.

In 1956, AEC sampled forty industrial radioisotope users. In this sampling, primary consideration was given to economics and benefits such as material savings, labor savings, savings in facilities maintenance and downtime, increase in sales as a result of new or improved production and other possible benefits such as improved research methods. Many industrial groups had savings well documented; others noted that benefits were admittedly large but to which they found it difficult to assign a dollar value. In these latter instances, the Commission accepted the best company estimate. As a result of this sampling, an extrapolation to the total number of licenses and each major type of use indicated that the savings lay in a range between 295 and 485 million dollars per year. A probable value of over one third of a billion dollars is a conservative estimate of the total impact of radioisotopes on industry in 1956.

In testimony before the Joint Congressional Committee on Atomic Energy on February 25, 1959, George B. Foster, Vice President and Technical Director, Industrial Nucleonics Corporation, surveyed the field of nucleonic gauging and reported, in part: "In basic industries (steel, paper, rubber, etc.) installations of nucleonic measurement control systems may cost from $15,000 to $250,000..... With approximately 4,000 such systems now in operation throughout a broad spectrum of American industry, savings are estimated in the neighborhood of $300 million annually in raw materials alone."

The contract with the Conference Board will provide the Commission with current information in the following general areas:

(more)

a. A census of radioisotope applications in industry.

b. A discussion of the general techniques involved in specific industrial applications.

c. A listing of other possible methods as substitutes for radioisotope applications.

d. Approximate costs involved in preparing to use radioisotopes.

e. Savings in materials, labor costs, facility maintenance, and downtime from radioisotope use.

f. An accounting of possible increase in sales as the result of new or improved products, and estimated value.

g. A listing of other possible benefits from radioisotope use, such as improved research and development methods, and estimated value.

- 30 -

NOTE TO EDITORS AND CORRESPONDENTS: A copy of the preliminary report is available for inspection at the Visitors' Aid Desk at the Commission's Washington, D. C. office at 1717 H Street, N.W.

4959

DATE:

INDEX: ISOTOPES-3-Distribution and Transfer

TO:

FROM:

SUMMARY: AEC 852/232: RADIOISOTOPE SALES AND DISTRIBUTION. Paper re the forthcoming visit of Mr. J.L. Gray from Atomic Energy of Canada and the subjects of discussions included in his visit. Mr. Gray makes a suggestions in this paper that the US and Canada try to improve their cooperation policies re isotopes sales,production and distribution

FILED:

INDEXER: R&D-1-P&P

REMARKS: date of paper: 4-7-59

CONFIRMED TO BE UNCLASSIFIED
DOE NNI DECLASSIFICATION REVIEW E.O. 12958
BY JOI G. BUCKNER DOE/NNI-623

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

April 6, 1959

MEMORANDUM FOR THE GENERAL MANAGER:

Today I was called by Mr. Clark Thompson of the National Industrial Conference Board. This call was made at the request of Mr. Sinclair, President of the Board.

The National Industrial Conference Board has recently completed studies under contract with the Atomic Energy Commission on the use of radioisotopes in industry and the estimated savings resultant therefrom. The report was submitted in three parts on January 12, and the fact that the report is in our hands is known to industry.

The magazine, Electronics, intends to run an article on this matter and it is reported that the article will accuse the AEC of suppressing the reports. This stems from the fact that the report estimated annual savings to industry of [illegible] a year as compared with AEC's contention, as often stated by Dr. Libby, that savings were over $[illegible],000,000 a year.

I am told that it will be Electronics' contention that this is embarrassing to AEC and for that reason the reports are being suppressed.

Apparently there are two volumes, one of which covers information on the findings, type of savings, and other general information; the other being a census of users of isotopes, containing no information of a privileged nature.

The one volume, however, which gives specific uses of radioisotopes on a license by license basis deals with the economic affairs of the reporting companies and this data is considered privileged.

Dr. Libby has told me that he takes exception to the NIC statements on economics; that he believes they are all wrong, and are not factual. On the other hand, NIC tells me that their figures are taken directly from industry and represent the industrial users' appraisal of the benefits to them of the use of radioisotopes.

46-59

I think this requires immediate action. I see no reason why the two volumes mentioned above should not be released promptly. We also will, within our province, make any comments we care to concerning the propriety of the NEC economies. It is important to note that Humanities will go to press on April 12, and, therefore, this matter should be handled promptly.

John A. Nelson

Sartpiu - 5-Dist

UNCLASSIFIED

March 24, 1959

AEC 994/4

COPY NO. 44

AEC 994/4

ATOMIC ENERGY COMMISSION

ISOTOPES DEVELOPMENT

Note by the Secretary

The General Manager has requested that the attached letter to the Executive Director, JCAE, be circulated for the information of the Commission.

W. B. McCool

Secretary

DISTRIBUTION	COPY NO.
Secretary	1
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X-Ch m-2 JCAE

UNCLASSIFIED

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D. C.

March 10, 1959

Mr. James T. Ramey
Executive Director
Joint Committee on Atomic Energy
Congress of the United States

Dear Mr. Ramey:

The Commission appreciates the opportunity to comment on the testimony of Mr. Samuel S. Auchincloss, President, Tracerlab, Inc., which was transmitted with your February 20 letter.* The Committee's interest in the Isotopes Development Program is welcomed and gratifying. We hope the individual members share the sense of urgency, if you will, of our effort to accelerate the applications of radioisotopes and radiation throughout American industry.

While the Commission agrees with Mr. Auchincloss in recognizing the critical importance of stimulating management understanding of isotopes and radiation, we nevertheless, must view this national development in effort somewhat different perspective. In pursuing our development program, we believe that there is a clear line of demarcation between government and industry responsibilities for encouraging radioisotope utilization. Demonstration of applications already in profitable use throughout industry appears to be the normal responsibility of industry itself and, specifically of the companies marketing the required equipment or instrumentation. A demonstration program designed to exploit methods, procedures, and systems, which have been adopted by certain segments of industry, appears to be well suited for aggressive sales promotion by private enterprise. In contrast, we believe the funds budgeted for the Isotopes Development Program should be expended in advancing the technology and development of new radiation techniques and applications. Naturally, in the course of this major development effort, there will be a demonstration stage; however, this activity will be confined to the "new" technology and its application.

Despite our primary interest in pioneering of research and development, we are acutely aware of management reluctance to adopt radiation techniques. Accordingly, for the past year, we have taken an active role in sponsoring conferences and meetings designed to review the economic and management implications of radioisotope use and to examine specific applications in wide industrial use. Meetings have been held in Baltimore, Maryland; Clemson, South Carolina; Miami, Florida; and Manhattan, Kansas. Two additional management oriented meetings are presently scheduled: Atlanta, Georgia on May 11-12 and San Francisco, California in December 1959.

Recognizing that stimulation of management interest would be fruitless if technical training opportunities were not available,

*On file in Office of Isotopes Development.

UNCLASSIFIED

the Commission has established a series of courses in industrial radioisotope techniques. The first industrial radioisotope course is presently under way at the Oak Ridge Institute of Nuclear Studies with students from a wide range of industrial organizations. The second course will begin on April 6 and applications have already been received from technical personnel employed by twenty major corporations. We also recognize the contributions which colleges and universities can make to this industrial training effort and have planned a series of regional training centers to bring industrial training close to its audience. The first regional program will be under way this summer at the University of California where three courses will be made available to industrial scientists, engineers, technical management and the general management group.

The features of the Commission's industrial isotope development program outlined above are typical of efforts being made to bring the advantages of radioisotopes and radiation into clear industrial focus. Moreover, development of industrial applications is being encouraged on a broad basis in cooperation and contract work with private companies such as Tracerlab, universities, and research institutes. Through this many-faceted development effort, we believe that the government is making a balanced and positive contribution to advancement of industrial radioisotope technology. To dilute this effort by demonstrations of techniques or instrumentation already developed and already in use by over 1,000 companies would not be consistent with the Commission's responsibility for exploiting the many benefits which can accrue from new developments in radioisotope and radiation use.

I trust that these comments will assist you.

Sincerely yours,

/s/ Paul F. Foster

Deputy General Manager

FORM AEC.804
(9-47)

DATE:

INDEX: Isotopes 3

[redacted]

TO:

FROM:

SUMMARY: AEC 398/19 - INCREASE IN TRITIUM AVAILABILITY FOR CIVILIAN PROGRAM
To consider establishing a tritium pool for all programs other than weapons and controlled thermonuclear. The market for tritium is developing in civilian and non-weapon s military applications, and these uses of tritium could become a major part of the Commission's program for nonpower peaceful uses of atomic energy.

FILED: Isotopes Program 3-1 Civilian Requirements for Isotopes

INDEXER: date of paper: 3-6-59

REMARKS:

CHANGED TO UNCLASSIFIED
DOE MSI DECLASSIFICATION REVIEW E.O. 12958
BY: JOI S. BUCKNER DOE/NN-923

U. S. ATOMIC ENERGY COMMISSION

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3-6-59

☆ U. S. GOVERNMENT PRINTING OFFICE—1955—[illegible]

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. B-24
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Friday, February 20, 1959)

MIDWESTERN CONFERENCE ON INDUSTRIAL USES OF RADIOISOTOPES

The U. S. Atomic Energy Commission and Kansas State College are co-sponsoring a two-day Midwestern Conference on the Industrial Uses of Radioisotopes in Manhattan, Kansas on February 25-26, 1959. This introduction to the many industrial applications of radioisotope techniques is part of the Commission's isotope development program. The program has as its objective increased understanding of the versatility of these nuclear tools.

Industrial and AEC speakers will review the economic and management implications of radioisotope use and examine specific industrial applications including radiography, tracing and gauging. An important part of the meeting will be a series of reports from midwestern manufacturers on their experiences with radioisotopes.

Management and technical personnel wishing to attend the meeting should register with the Conference Coordinator, Department of Continuing Education, Kansas State College, Manhattan, Kansas.

- 30 -

22059

FORM AEC-604
(6-47)

DATE:

INDEX: ISOTOPE-3

[redacted]

TO:

FROM:

SUMMARY: AEC 158/8: EQUIPMENT GRANT AWARD FOR RADIOISOTOPE TECHNOLOGY TRAINING
Memo and attachements re the Equipment Grant Award for the Univ. of California. The equipment will be utilized in three special study programs to be initiated this summer as part of the Univ. Nuclear Eng. Extension Program and in regular science and engineering curricula.

FILED:

INDEXER: ISOTOPE PROGRAM-21

REMARKS: date of paper: 2-13-59

CONFIRMED TO BE UNCLASSIFIED
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BY JOH S. BUCKNER DOE/NN-622

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

2-13-59

☆ U. S. GOVERNMENT PRINTING OFFICE: 1951 - 940807

AEC

Isotopes. 3

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. B-19
Tel. HAzelwood 7-7831
Ext. 3446

FOR IMMEDIATE RELEASE
(Thursday, February 12, 1959)

ORNL HAS LARGE 1958 INCREASE IN AMOUNT OF RADIOISOTOPES SHIPPED

John A. McCone, Chairman of the Atomic Energy Commission, announced today that the amount of radioisotopes shipped from the Atomic Energy Commission's Oak Ridge National Laboratory for use in the peaceful applications of nuclear energy increased 37 percent during 1958.

The amount shipped in 1958 also represents 37 percent of the total radioisotopes shipped from the laboratory during the 12 years that the program has been under way.

(During the first month of 1959, the laboratory made 1,099 shipments totalling 16,086 curies.)

A total of 228,717 curies of radioisotopes were shipped during 1958, compared to 166,652 curies during 1957. A total of 614,565 curies have been shipped from the laboratory since the radioisotopes program was started with the first shipment August 2, 1946.

While the total quantity of radioactivity units shipped increased sharply, the number of shipments for 1958 showed only a slight increase from 1957. This resulted largely from the increased size of individual shipments to private firms which were making further distribution to ultimate users and from larger individual shipments of cobalt 60, cesium 137, iodine 131 and phosphorus 32.

Sales returns decreased from $2,599,284 in 1957 to $2,438,169 in 1958, reflecting a reduction in prices for cobalt 60 effective August 1, 1957. The laboratory made 1,061 shipments containing 5,893 curies in December, making a total of

(more)

2-12-59

14,131 shipments for the calendar year. During 1957 there were 14,126 shipments, and 118,655 shipments have been made since the program started in 1946.

Of the 1958 shipments, 552, valued at $467,917, went to some 28 foreign countries, with Japan receiving the largest number. During 1957 there were 381 foreign shipments, valued at $225,978. The bulk of radioisotopes furnished overseas users is shipped by commercial suppliers rather than directly by the laboratory. There were approximately 2300 foreign shipments by commercial suppliers in 1958. Sixty-five foreign countries have received isotopes shipments since September 1947.

During late 1958 the laboratory began first shipments from the Multicurie Fission Products Pilot Plant, a chemical processing facility for recovery of usable radioisotopes from reactor fuel element processing wastes. The first material from the new plant was used as part of a 2,000 curie cesium-137 source for a teletherapy machine at a California medical research center.

The Oak Ridge National Laboratory, operated for the Commission by Union Carbide Corporation, is the nation's principal supplier of radioisotopes.

- 30 -

(NOTE TO EDITORS AND CORRESPONDENTS: This information is being issued simultaneously at Oak Ridge, Tennessee by the Oak Ridge Operations Office of the Commission)

21259

JAN 1 5 1958

Mr. J. R. Smith, Jr., Director
International Cooperation Administration
Washington 25, D.C.

Dear Mr. Smith:

Further to my letter of December 11, I am enclosing a packet of pertinent publications relating to the utilization of radioisotopes in industry, medicine, agriculture and research. Included among them are bibliographies that list many thousands of publications and open literature references. Most of these publications form a part of the technical libraries which have been furnished to 34 countries as a part of the Atoms for Peace program. We would be pleased to make the necessary arrangements to provide you with additional packets for transmittal to ICA's missions abroad, if you wish.

The Commission has been supplying radioisotopes to foreign nationals since 1947. These materials are unclassified, widely available at low cost, and are highly beneficial. Over 10,000 shipments have been made from the United States to 65 countries. The Atoms for Peace Mission teams which have visited a number of the less technically advanced countries have all included radioisotope experts and the value of these materials in agriculture, biology, medicine and industry, as well as their value as a general research tool, has been emphasized.

The following is the procedure by which foreign customers may procure radioisotopes from the United States. For radioisotopes from atomic number 3 (lithium) to 83 (bismuth), inclusive, a foreign customer does not need an AEC license, but can order directly from the many commercial suppliers in the United States. If the foreign customer chooses to obtain radioisotopes from the Commission, Form AEC 391 (enclosed) must be completed and addressed to our main supplier, Oak Ridge National Laboratory, Isotopes Sales Department, P. O. Box X, Oak Ridge, Tennessee. A letter of credit or the necessary remittance must also be included with the order.

The export of radioisotopes not in the "3 to 83" group, as well as any radioisotopes destined for a Soviet Bloc country, will require the United States supplier to obtain a special authorization from the AEC. As a part of the information required in obtaining such an authorization a foreign national must indicate where and by whom the material will be used and for what purpose.

The Commission staff is presently considering the advisability of issuing a brochure, especially prepared for use by foreign governments, concerning availability of radioisotopes from the U.S. and procedures for obtaining them. Such a brochure might be especially helpful to the less technically advanced countries which have only recently begun to familiarize themselves with the uses of radioisotopes.

Although radioisotopes are widely available, their exploitation is not meaningful without the necessary instruments and equipment for their utilization. In this connection, the proposed equipment grant program under which our Government will provide financial assistance to other nations for the procurement of radioisotopes equipment, should prove extremely useful.

With respect to the specific question noted in the final paragraph of your letter it is apparent, of course, that possession of a reactor is not a necessity for a country wishing to engage in a radioisotopes program. However, apart from its ability to produce isotopes, a research reactor is also a very valuable tool in basic research and in training of personnel in the atomic energy field. In addition, adoption of a research reactor program often serves as a spur to the general scientific development of a country. As you know, we do not accept a reactor grant to a country until the reactor project proposal has undergone a careful review which the Atomic Energy Commission is satisfied that the principal problems inherent in the construction and operation of a reactor are recognized and that there is reason to feel confident that they will be dealt with competently. Among the factors considered in that review are not only technical data but also information concerning the organization for operating and utilizing the facility, plans for supervision and approval of experimental procedures, a description of training plans if qualified technical personnel are not already available, and a brief characterization of the proposed technical program. I do not know of any instance where a reactor acquired with aspect of a United States grant is not being usefully employed and I believe that any country which can meet the criteria outlined above should not be discouraged from undertaking a research reactor project.

I trust that the foregoing information and enclosed publications will be of assistance to you.

Sincerely yours,

SIGNED, A. R. LUEDECKE

General Manager

cc: GM
AGNIA
[Backgrounds]

IVA CONCURRENCES:
Fullerton
Lenzner
Palmer
Vogel
Jones
GM

Enclosures:
See Attached List

DA|AE DTD LAR AGNIA

FUNDIA:Mbo Wells

2/7/59

Special Sources of Information on Isotopes (TID 4563 (Rev.)
What's Available in the Unclassified Atomic Energy Literature (TID 4550 (5th Rev.)
Radioisotopes (a reprint from "Atomic Energy Facts")
Principles of Isotope Utilization
Uses of Isotopes in Industry and in Physical and Chemical Research
Uses of Isotopes in Agricultural Studies
Uses of Isotopes in Medical Research, Diagnosis and Therapy
Illustrations of Isotope Applications
Illustrations of Isotope Applications in Biology and Medicine, Therapy
Design of Laboratories for Safe Use of Radioisotopes (ABCD-2225)
Courses in Techniques of Using Radioisotopes in Industry
Bibliography on Uses of Radioactive and Stable Isotopes in Industry (TID-3511)
Radioisotopes in Medicine and Human Physiology (TID-3514)
Isotopes... (TID-3075) (1955-1957)
Isotope and Service Irradiation Order Form
World Development of Radioisotopes, December 1957
Title 10 - Atomic Energy (AEC Reprint Containing Amendments Issued through October 17, 1957)

DATE:

INDEX: ISOTOPE-3-

TO: Alvin A. Luddecke, General Manager

FROM: Paul C. Aebersold, Director, Office of Isotope Development

SUMMARY: EDUCATION AND TRAINING IN RADIOISOTOPE PRINCIPLES AND INDUSTRIAL TECHNOLOGY. Memo re the above subject. This is an implementation of a staff paper AEC 994/2."Implementation of the Isotope Development Program. Included in this paper was a means to overcome the present education deficiencies in the area of isotope development. The Dev. of Isotope Devel. is now ready to implement thas action .

FILED:

INDEXER: ISOTOPE*21

REMARKS: date of meme: 12-11-58

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DOE NSI DECLASSIFICATION REVIEW E.O. 12958
BY: JOI S. BUCKNER DOENNI-659

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

DATE:

INDEX: Isotopes 3

TO:

FROM:

SUMMARY: Ltr. from Dr. Seaborg to the AEC on the subject of a very high flux pile and recommends that official approval be given to the national heavy isotope production program & immediate steps be taken on design and construction of an ultra-high flux pile, something like the Mighty Mouse.

FILED: PLB&L 50 High Flux Reactor

INDEXER: date of ltr: 10-3-58

REMARKS:

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DECLASSIFICATION REVIEW E.O. 12958
BY JOE B. BUCKNER DOE/NN-823

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

10-3-58

Isotopes-3

STANDARD FORM NO. 64

~~OFFICIAL USE ONLY~~

Office Memorandum • UNITED STATES GOVERNMENT

TO : Frank K. Pittman, Director
Office of Industrial Development

DATE: September 30, 1958

FROM : W. B. McCool, Secretary

SUBJECT: ESTABLISHMENT OF ISOTOPES LABORATORY

SYMBOL: SECY:RVW

1. During discussion of the FY 1960 budget at Meeting 1404, on September 18, 1958, the Commissioners requested recommendations for establishment of an isotopes laboratory to combine the Isotopes Development Laboratory and the Radiation Application Laboratory. Mr. Libby requested that a university be considered as a possible location for the laboratory in preference to either the Brookhaven or Oak Ridge sites.

2. The General Manager has directed that you prepare for submission to the Commission recommendations on the establishment of such a laboratory.

cc: General Manager
Asst. Gen. Mgr. for Administration
Asst. Gen. Mgr. for R&ID
General Counsel
Controller
D. C. Office

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UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

No. TI-9
Tel. HAzelwood 7-7831
Ext. 4463

FOR IMMEDIATE RELEASE
September 29, 1958

AEC ANNOUNCES JOINT INDUSTRY-GOVERNMENT PROGRAM TO DEVELOP INDUSTRIAL USES OF RADIOISOTOPES

The AEC is inviting industry to participate in a joint effort to develop additional, everyday uses for radioisotopes important to the national economy. This will be accomplished through AEC-financed research and development contracts to develop new and extended applications proposed by private industry. Groundwork for an industry-Government development program has been completed and industry is now invited to participate in the expanded program.

The attached invitation sets forth the types of information that should be included in a proposal, the criteria of acceptance, and other pertinent information. Additional information on submitting contract proposals may be obtained from the Director, Office of Industrial Development, U. S. Atomic Energy Commission, Washington 25, D. C.

Of the literally hundreds of beneficial applications of atomic energy, probably the most widely known is the nuclear reactor for producing electric power. Less well known are reactor byproducts -- radioisotopes -- which are regarded as having almost unlimited potential for enhancing the national welfare and economy.

The expanding program will encourage private organizations to find new industrial uses for radioisotopes and radiation, and to extend already known uses. It provides for training industrial personnel in needed technology. The AEC, which in the past has produced most of the needed radioactive materials and services, is now encouraging private enterprise to undertake this important function as rapidly as possible.

Already radioisotope gaging technology is well advanced in many industries. In rubber manufacture, energy from a small radioactive source is used to maintain a constant check on the thickness of coating placed on tire cords, and the

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information is passed on to automatic controls that open or close the calender rolls as the situation demands. In the steel industry, similar sensing devices and controls open and close mill rolls to "iron out" thickness deviations in steel strip. Radioisotope gaging systems are currently employed to control calendered sheets of linoleum, vinyl, asphalt tile, rubber, plastics, and dozens of other products.

Even more unusual is the versatile radioactive tracer. Employed in tool wear measurements, welding problems, diffusion and surface studies, oil field applications, refinery operations, and for many other uses, the tracer isotope has displayed almost unlimited potential.

To lay a foundation for expanded uses, the Commission has already begun initial studies, which include:

1. Developing a technique for routine measurement of tool wear, using a low-level radioactive source. Industry now spends millions of dollars a year on tool replacement. Information developed through this study could provide means for lengthening tool life greatly and for decreasing costs of machining metals.

2. Developing a radiochemical method for detecting and analyzing industrial gases that are toxic but not radioactive. To detect very small quantities of such gases rapidly and accurately, a rugged, compact device, adaptable to battery operation for field use, is envisioned.

3. Investigating the technology and applications of massive quantities of fission products as sources of beta radiation. This "soft" radiation is particularly suited to many kinds of radiation processing. Beta radiation can fill an important need for applications where only surface effects are needed -- for example, surface pasteurization of foods, or surface modification of formed plastics.

4. Planning and procuring equipment for industrial isotope training courses. Inadequate industrial isotope technology training stands in the way of fuller utilization of radioisotopes. Special courses in isotope technology for workers in highly industrialized areas should go far toward solving this problem.

5. Studying the feasibility of using sodium reactor coolant as a source of high-level gamma radiation for industrial processes. It may be possible to combine an irradiation processing facility with a sodium-cooled power reactor.

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6. Technical, economic and managerial evaluation of the present status and future prospects for industrial applications of high-level radiation and identification of factors to be resolved in realizing their development.

The table below gives further details on contracts awarded so far this year.

The Commission has budgeted $3.65 million to finance additional research and development through June 1959.

Other steps to implement the program are planned or already under way. In April of this year at Clemson, South Carolina, a symposium on "Uses and Potential of Radioisotopes in the Textile Industry" was co-sponsored by Clemson College, the Southern Governors Nuclear Committee and the AEC. About the same time, in Baltimore, Maryland, Loyola University and the Baltimore Nuclear Society, with AEC participation, sponsored a symposium on "Industrial Utilization of Radioisotopes" which was attended by approximately 150 representatives from 80 industrial groups. Several additional symposia are planned for the next few months. Dates and locations will be announced shortly.

Selected Sources of Information on Isotopes (TID 4563), the first and basic AEC guide to Government and private publications concerned with radioisotope research and application, has recently been revised. Copies are available upon request from the Isotope Technology Branch, Office of Industrial Development, U.S. Atomic Energy Commission, Washington 25, D. C.

NAME OF CONTRACTOR	WORK UNDERTAKEN	TYPE OF CONTRACT & AMOUNT
Tracerlab, Inc.	To develop (1) a Radiochemical Analyzer for non-radioactive gases and (2) clathrate compounds --cage-like hydrocarbon structures capable of trapping and concentrating rare gases such as Krypton 85.	Cost-type, est. $49,000

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NAME OF CONTRACTOR	WORK UNDERTAKEN	TYPE OF CONTRACT & AMOUNT
Battelle Memorial Institute	To develop (1) radioactive tracer quality control systems and (2) to study the radiation chemistry of hydrocarbons trapped in inclusion compounds. Radio-chemical analytical techniques such as isotope dilution and activation analysis will be investigated and adapted as a means of process control. Straight-chain hydrocarbons irradiated in organic complexes, such as urea or quinone, frequently form branched-chain structures. A more thorough understanding of this reaction is of major significance to industrial radiation processing.	Cost-type, est. $33,000
Nuclear Science and Engineering Corp.	To study and develop specific devices and techniques for industrial applications of radioisotopes. Work on this contract will be devoted to developing a portable, variable height, liquid level measuring device and a nuclear height gage for measuring solid materials in bulk storage containers.	Cost-type, est. $22,550
National Industrial Conference Board	To make a complete survey of industrial uses of radioisotopes. All byproduct licensees will be contacted by mail and at least one hundred will be surveyed in person. The objective and final report for the Commission will show the various uses made of radioisotopes and the actual and intangible benefits resulting therefrom.	Fixed price, $30,000

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NAME OF CONTRACTOR	WORK UNDERTAKEN	TYPE OF CONTRACT & AMOUNT
Emerson Radio and Phonograph Corp., (acting for CEM group--chemicals, electronics, metallurgy), composed of the General Aniline and Film Corp., Emerson, and Revere Copper and Brass, Inc. Arthur D. Little is subcontractor for technical aspects of the study.	Technical, economic and managerial study of industrial applications of high-level radiation	Lump sum $86,847 Contract to be completed in ten months
Atomics International Division of North American Aviation	Study of the technical feasibility of using radioactive sodium coolant at the Hallam Nuclear Fuel Power Plant for industrial radiation processing. Included will be a preliminary design study for such a radiation processing plant.	Fixed ceiling $76,000
Curtiss-Wright Corp.	Construction of a high intensity food irradiator ("HI-FI"). Source of radiation will be 2 to 3 megacuries of Cobalt 60	Cost-type, Estimated $1,605,000
General Atomics Div. of General Dynamics Corp.	Develop and Refine the Szilard-Chalmers process to produce high specific activity, short-lived radioisotopes with low power reactors.	Cost-type, estimated $61,600
Armour Research Foundation	To develop and produce isotopic sources of low energy secondary X-rays utilizing beta-emitting radioisotopes. These low energy photon sources hold numerous applications for measurement and testing of low density materials.	Cost-type, estimated $53,000

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NAME OF CONTRACTOR	WORK UNDERTAKEN	TYPE OF CONTRACT & AMOUNT
Radiation Applications, Inc.	To determine the present technology and to evaluate radioisotopes suitable for large beta radiation sources for surface modification processes.	Cost-type, estimated $32,300

INFORMATION AND TRAINING ACTIVITIES

ORGANIZATION	WORK UNDERTAKEN	TYPE OF CONTRACT & AMOUNT
Stanford Research Institute	Technical and economic analysis of current and projected utilization of radioisotopes in medical research, diagnosis, and therapy.	Cost plus fixed fee, estimated $60,000
W. H. Johnson Associates	To develop industrial radioisotope training courses, develop experiments in basic and applied high-level radiation, and to research high-level phenomena and technology	Cost plus fixed fee, estimated $89,000

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INVITATION FOR RADIOISOTOPE DEVELOPMENT PROPOSALS

Industrial organizations and research laboratories are invited during the period ending June 30, 1959, to submit proposals to the Atomic Energy Commission for isotope development projects calculated to advance the technology and benefit the national welfare and economy. Reliance must be placed upon engineers and technicians, familiar with their own industrial problems, to propose new or improved ways for applying radioisotopes. In other cases where broad areas of use await completion of fundamental studies, specialized work may be designated and proposals invited thereon by the Commission. The AEC will consider entering into Commission-financed research and development contracts under Section 31 a. of the Atomic Energy Act of 1954 with organizations whose proposals meet the criteria established for this program. Six copies of each proposal should be submitted to the Director, Office of Industrial Development, U.S. Atomic Energy Commission, Washington 25, D. C.

Information submitted in preliminary discussion and contract proposals under the Isotope Development Program will be treated as business confidential upon request of the proposer. Such information unless otherwise available to the Commission, will not be divulged to persons outside the Commission without the consent of the proposer. When a contract is let, the Commission plans to issue a public statement giving summary information about the contract. All technical information developed under the contract will be the property of the Government and may be disseminated to the public for general use.

Radioisotope development proposals should generally include, but not be restricted to, the following details: (a) clear statement of the problem and existing state-of-the-art, (b) why radioisotopes are used or recommended, (c) other competitive methods, (d) expected economic advantage of radioisotopes in the industrial use, (e) how widespread is the proposed use in terms of number of industries and number of units involved, (f) scope of work to be undertaken, (g) details of techniques to be used, (h) number and qualifications of persons who will work under the contract, (i) description of equipment and facilities to be used for the contract work, (j) company experience relating to this type of work, (k) schedule of work (the time necessary to complete the work and a performance schedule chart indicating the time of each phase), (l) a breakdown of the estimated total cost of the project, and (m) name of person who is authorized to negotiate for the company.

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Individual proposals will be evaluated on the basis of the following general criteria: (a) potential contribution to the national economy and welfare, (b) advancement of technology, (c) originality of proposed development activity, (d) general applicability to industry, (e) application to key industries where radioisotopes have not been exploited, (f) specific experience in area of proposed development, (g) competence and responsibility of the applicant, including organization, experience, facilities and financial responsibility, and (h) cost to AEC.

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August 25, 1958

AEC 994/3

COPY NO. 42

AEC 994/3

ATOMIC ENERGY COMMISSION

SUMMARY OF ACTIVITIES IN THE ISOTOPES DEVELOPMENT PROGRAM

Note by the General Manager

Attached for the information of the Commission is a statement prepared by the Office of Industrial Development summarizing activities of the Isotope Development Program for the period April 1, 1958 to June 30, 1958.

Paul F. Foster

General Manager

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ATOMIC ENERGY COMMISSION

SUMMARY OF ACTIVITIES IN THE ISOTOPES DEVELOPMENT PROGRAM

1. Radioisotope Production and Pricing Activities

A. Over-all review continued on cost experience relative to present prices for radioisotopes.

B. Studies were begun to reexamine AEC pricing policy for radioisotopes. Purpose of this examination is to consider changes which may be necessary to carry out objectives of the Isotopes Development Program.

C. A staff paper aimed at increasing the availability of tritium to licensees was prepared and is currently circulating for concurrence.

2. High-Level Radiation Activities

A. On June 11, 1958, a contract was signed with Emerson Radio & Phonograph Corporation to conduct a technical, economic and managerial study of industrial applications of high-level radiation for the lump sum of $86,847. Emerson is acting for the CEM Group (chemicals, electronices, metallurgy) composed of the General Aniline and Film Corporation, Emerson Radio & Phonograph Corporation and Revere Copper and Brass, Inc. Emerson is engaging Arthur D. Little, Inc. as subcontractor for technical aspects of the study. The contract is to be completed in ten months. This study will be used by the Office of Industrial Development as a basis for recommendations to the Commission on a definitive program to accelerate development of industrial uses of high-level radiation.

B. A cost-type contract with a fixed ceiling of $76,000 was negotiated with Atomics International, Division of North American Aviation, to study the technical feasibility of using the radioactive sodium coolant at the Hallam Nuclear Power Plant for industrial radiation processing. Included will be a preliminary design study for such a radiation processing plant.

C. On July 17, 1958, a contract was signed with Curtiss-Wright Corporation to construct a high intensity food irradiator ("HI-FI") for an estimated cost of $1,605,000. The source of radiation will be 2 to 3 megacuries of Cobalt 60.

3. Radioisotope Applications Development Activities

A. Cost-type contract was negotiated through SAN with General Atomics, Division of General Dynamics Corp., at an estimated cost of $61,600 to develop and refine the Szilard-Chalmers process to produce high specific activity, short-lived radioisotopes with low power reactors.

B. A cost-type contract was negotiated through COO with Armour Research Foundation at an estimated cost of $53,000 to develop and produce isotopic sources of secondary X-rays utilizing beta-emitting radioisotopes. These low energy photon sources hold numerous applications for measurement and testing of low density materials.

C. A cost-type contract was negotiated through NYOO with Radiation Applications, Inc., at an estimated cost of $32,300 to determine the present technology and to

evaluate radioisotopes suitable for large beta radiation sources. Beta radiation sources are potentially valuable for surface modification processes such as surface treatment of packaged foods, plastics, and other materials.

D. A cost-type contract was negotiated through NYOO with Tracerlab, Inc., at an estimated cost of $49,000 to develop (1) a Radio-chemical Analyzer for non-radioactive gases and (2) clathrate compounds--cage-like hydrocarbon structures capable of trapping and concentrating rare gases such as Krypton 85. Monitoring of toxic industrial gases requires a rapid, sensitive, and rugged detection system such as envisioned with this device.

E. A cost-type contract was negotiated through COO with Battelle Memorial Institute at an estimated cost of $33,000 to develop (1) radioactive tracer quality control systems and (2) to study the radiation chemistry of hydrocarbons trapped in inclusion compounds. Radiochemical analytical techniques such as isotope dilution and activation analysis will be investigated and adapted as a means of process control. Straight-chain hydrocarbons irradiated in organic complexes, such as urea or quinone, frequently form branched-chain structures. A more thorough understanding of this reaction is of major significance to industrial radiation processing.

F. A cost-type contract was negotiated through NYOO with Nuclear Science and Engineering Corp. at an estimated cost of $22,550 to study and develop specific devices and techniques for industrial applications of radioisotopes. Work on this contract will be devoted to developing a portable, variable height, liquid level measuring device and a nuclear height gage for measuring solid materials in bulk storage containers.

G. A fixed price contract was negotiated through NYOO with the National Industrial Conference Board at a cost of $30,000 to make a complete survey of industrial uses of radioisotopes. All byproduct licensees will be contacted by mail and at least one hundred will be surveyed in person.. The objective and final report for the Commission will show the various uses made of radioisotopes and the actual and intangible benefits resulting therefrom.

H. Contract negotiations were undertaken through COO with Nuclear-Chicago Corp. to study and develop radiometric methods for industrial process control. The suggested approach was to divert a minute fraction of the process stream to an analyzer, wherein the sample may be discarded or recombined depending upon cost and health problems involved. Negotiations, however, reached an impasse when legal counsel for Nuclear-Chicago requested an interpretation of the Type A patent provisions concerning the clauses: "in connection with", and "in the course of". The cause of these reservations on the part of Nuclear-Chicago involves primarily patent rights with respect

to a device developed by Nuclear-Chicago for use in process control systems and to be used in performing the work under the proposed contract.

4. Information and Training Activities

A. Activities emphasized (i) the organization and preparation of comprehensive guides to radioisotope research and application in industry, medicine, and agriculture, (ii) organization of technical symposia designed to acquaint industry with the potential applications of radioisotopes, and (iii) analysis of current industrial technology training needs and subsequent participation with the Oak Ridge Institute of Nuclear Studies in the organization of the prototype course in industrial application of radioisotopes.

B. Stanford Research Institute has undertaken a technical-economic analysis of current and projected utilization of radioisotopes in medical research, diagnosis, and therapy.

C. W. H. Johnston Associates have contracted to develop industrial radioisotope training courses, develop experiments in basic and applied high-level radiation, and to research high-level radiation phenomena and technology.

D. A symposium was cosponsored with Loyola University and the Baltimore Nuclear Society on "Industrial Utilization of Radioisotopes" in Baltimore on April 7 and 8. Approximately 150 representatives from 80 industrial groups attended the two-day meeting.

E. This first effort was followed by participation with Clemson College and the Southern Governors Nuclear Committee in the presentation of a symposium on "Uses and Potential of Radioisotopes in the Textile Industry" at Clemson, South Carolina on April 4 and 5.

F. Three additional symposia will be offered during FY 1959 at Manhattan, Kansas; Atlanta, Georgia; and San Francisco, California.

G. "Selected Sources of Information on Isotopes" (TID-4563), developed as the first and basic AEC guide to government and commercial publications concerned with radioisotope research and application, was revised. The revision, now available, contains over 200 basic references to industrial, medical, and agricultural research and technology.

H. The need for expanded industrial training in radioisotope applications was explored with a group of industrial specialists in February. In view of conclusions reached at the meeting, a prototype course in basic industrial isotope technology is planned for October at the Oak Ridge Institute of Nuclear Studies.