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PROPOSED AMENDMENT TO EURATOM COOPERATION ACT OF 1958

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HEARING BEFORE THE SUBCOMMITTEE ON AGREEMENTS FOR COOPERATION OF THE JOINT COMMITTEE ON ATOMIC ENERGY CONGRESS OF THE UNITED STATES NINETY-THIRD CONGRESS

FIRST SESSION

ON

S. 1993 AND H.R. 8867, PROPOSED AMENDMENT TO SECTION 5
OF THE EURATOM ACT OF 1958, AS AMENDED

JUNE 22, 1973

Printed for the use of the Joint Committee on Atomic Energy

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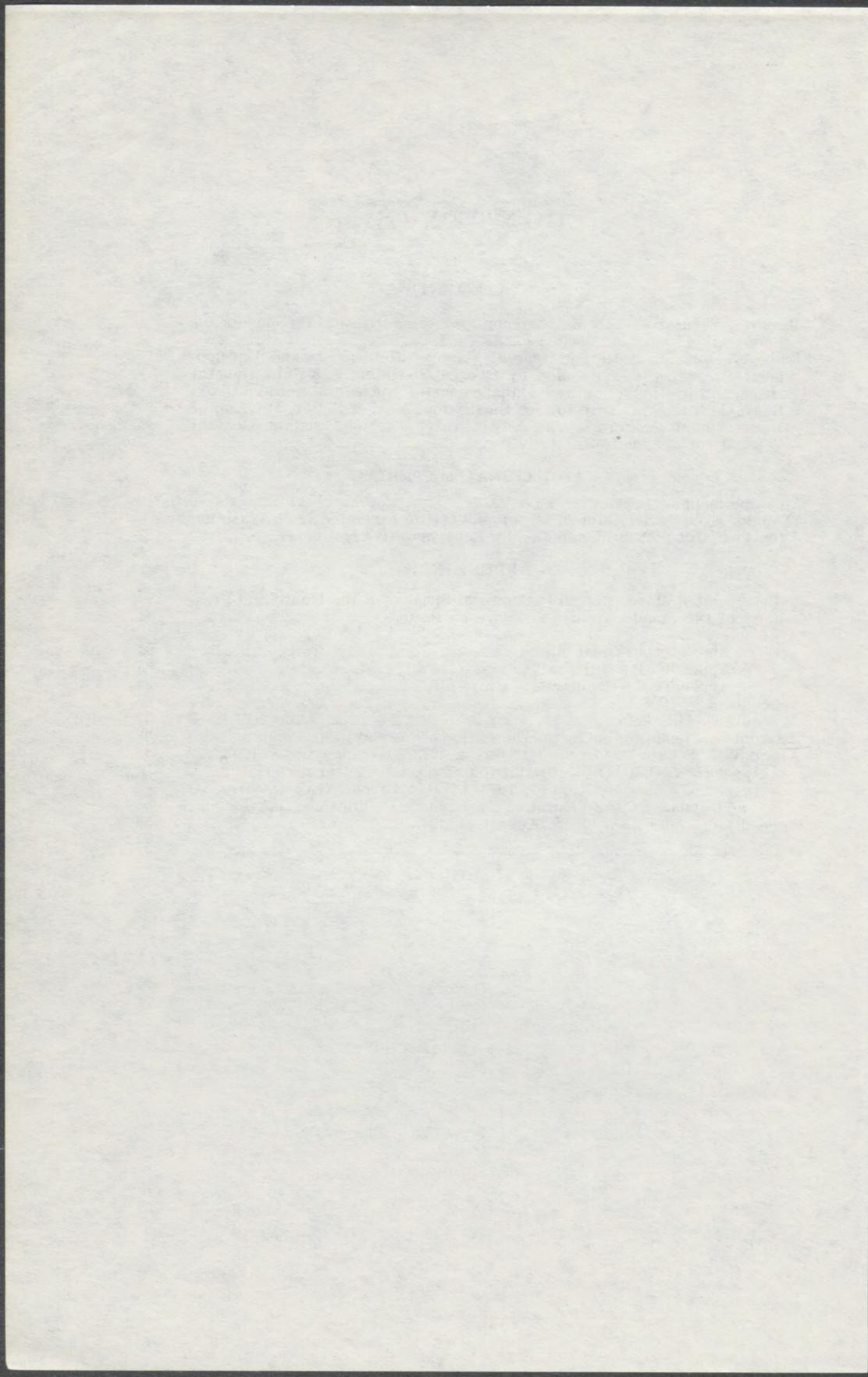
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**PROPOSED AMENDMENT TO THE EURATOM
COOPERATION ACT OF 1958**

[S. 1993; H.R. 8867]

FRIDAY, JUNE 22, 1973

**CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON AGREEMENTS FOR COOPERATION,
JOINT COMMITTEE ON ATOMIC ENERGY,
*Washington, D.C.***

The Subcommittee on Agreements for Cooperation of the Joint Committee on Atomic Energy met at 2:10 p.m., pursuant to call, in room S-407, the Capitol, Hon. Joseph M. Montoya (chairman of the subcommittee) presiding.

Present: Senator Montoya; and Representatives Price, Holifield, Hosmer, and Hansen.

Also present: Edward J. Bauser, executive director; Peter A. Bernard, counsel; and Joe B. La Grone, congressional fellow.

OPENING STATEMENT OF CHAIRMAN MONTOYA

Senator MONTOKA. The subcommittee will come to order.

The purpose of this hearing is to consider a proposed amendment to section 5 of the Euratom Cooperation Act of 1958, as amended.

As proposed, this amendment would increase the quantity of contained uranium-235 that could be transferred to the European Atomic Energy Community from 215,000 kilograms to an amount of contained U²³⁵ which does not exceed that necessary to support the fuel cycle of power reactors located within the community having an installed capacity of 35,000 megawatts of electric energy, together with 25,000 kilograms of contained uranium-235 for other purposes. It is our understanding that this increase in terms of kilograms would amount to a total of 368,000 additional kilograms, over and above the 215,000 kilograms already authorized—or in other words, nearly twice as much as under the present ceiling.

This proposed amendment is subject to the requirements of section 54 of the Atomic Energy Act of 1954, as amended. This section of the act requires specific authorization by the Congress of the amount of special nuclear material which may be distributed by the Commission to a group of nations.

INITIAL AUTHORIZATION FOR TRANSFER

The initial authorization for transfer by the U.S. Atomic Energy Commission of enriched uranium to the European Community occur-

red in 1958, in conjunction with the United States-Euratom Joint Program Agreement, and was for 30,000 kilograms of contained uranium-235. The uranium ceiling of the Euratom Cooperation Act was increased to 70,000 kilograms in 1964 and again, most recently, to its present level of 215,000 kilograms in 1967.

On March 27, 1973, the Chairman of the Atomic Energy Commission submitted to the President of the Senate a proposal to increase the present ceiling of 215,000 kilograms of contained uranium-235. Included with that proposal were a draft bill and an analysis of the proposed legislation. (See app. 1.)

On June 13, 1973, Senator Pastore, vice chairman of the Joint Committee on Atomic Energy introduced a bill, identified as S. 1993, which authorized the ceiling increase proposed by the Atomic Energy Commission. On June 20, 1973, Mr. Price, chairman of the Joint Committee on Atomic Energy, introduced an identical bill, H.R. 8867. (See apps. 2 and 3.)

S. 1993 and H.R. 8867, have been referred to the Joint Committee on Atomic Energy and have been under review by the Subcommittee on Agreements for Cooperation. The subcommittee is particularly interested in understanding the reasons for the requested increase in the ceiling as well as the AEC's rationale for changing the method of expressing the quantities of uranium to be furnished for use in power reactors. The subcommittee is also extremely interested in learning how these proposed increases will affect AEC's ability to fulfill its enrichment commitments to foreign customers, particularly in terms of AEC's available capacity.

The subcommittee's intention to hold hearings on the proposed legislation was announced in an official press release on June 20, 1973, which will be included in the record at this point.

[Press release follows:]

JOINT COMMITTEE ON ATOMIC ENERGY TO HOLD HEARINGS ON PROPOSED AMENDMENT OF THE EURATOM COOPERATION ACT OF 1958

Senator Joseph M. Montoya, Chairman of the Joint Committee's Subcommittee on Agreements for Cooperation, announced today that his Subcommittee would hold hearings on June 22 at 2:00 p.m. on a proposed amendment to the Euratom Cooperation Act of 1958.

The proposed amendment would increase the quantity of contained Uranium 235 that could be transferred to the European Atomic Energy Community from 215,000 kilograms "to an amount of contained Uranium 235 which does not exceed that necessary to support the fuel cycle of power reactors located within the community having an installed capacity of 35,000 megawatts of electric energy, together with 25,000 kilograms of contained Uranium 235 for other purposes."

The initial authorization for transfer by the U.S. Atomic Energy Commission of enriched uranium to the European Economic Community occurred in 1958, in conjunction with the U.S.-EURATOM Joint Program Agreement, and was for 30,000 kilograms of contained Uranium 235. The uranium ceiling of the EURATOM Cooperation Act was increased to 70,000 kilograms in 1964 and again, most recently, to its present level of 215,000 kilograms in 1967.

Senator Montoya stated that the hearings will be open to the general public and are scheduled to be held on Friday in the Joint Committee Public Hearing Room S-407, in the U.S. Capitol. He added that in view of the brief notice for the hearing, the record would be held open for an additional 10 days. Senator Montoya also stated that during this time the Subcommittee would be willing to consider additional statements submitted for possible inclusion in the record and any requests to testify before the Subcommittee.

Subject to any objection by a member, copies of the other documents referred to will be included in the record as appendixes.

This afternoon we have scheduled four representatives of the Atomic Energy Commission to appear on behalf of the proposed legislation. It is the subcommittee's understanding that only one witness, Mr. John J. Flaherty, Assistant Manager, will present prepared testimony. Mr. Flaherty is accompanied by Mr. George F. Quinn, Assistant General Manager for Production and Management of Nuclear Material; Mr. Dixon B. Hoyle, Assistant Director for Supply and Market Policy, Division of International Programs; and Edwin E. Spingarn, Assistant General Counsel for International Activities.

As was announced in the press release, because of the brief notice for the hearing, the record will be held open for an additional 10 days. During that time the subcommittee will be willing to consider additional statements submitted for possible inclusion in the record and any requests to testify before the subcommittee.

Mr. Flaherty, you may proceed with your statement.

STATEMENT OF JOHN J. FLAHERTY, ASSISTANT GENERAL MANAGER FOR ENERGY AND DEVELOPMENT PROGRAMS; ACCOMPANIED BY GEORGE F. QUINN, ASSISTANT GENERAL MANAGER FOR PRODUCTION AND MANAGEMENT OF NUCLEAR MATERIAL; DIXON B. HOYLE, ASSISTANT DIRECTOR FOR SUPPLY AND MARKET POLICY, DIVISION OF INTERNATIONAL PROGRAMS; AND EDWIN E. SPINGARN, ASSISTANT GENERAL COUNSEL FOR INTERNATIONAL ACTIVITIES, ATOMIC ENERGY COMMISSION

Mr. FLAHERTY. Thank you very much, Mr. Chairman, and members of the subcommittee. I am pleased to appear before this subcommittee in regard to S. 1993 and H.R. 8867. These bills would amend section 5 of the Euratom Cooperation Act of 1958. This proposal would increase the amount of contained U^{235} which may be transferred to the European Atomic Energy Community pursuant to section 54 of the Atomic Energy Act. The proposed increase is from 215,000 kilograms of U^{235} to an amount of contained U^{235} which does not exceed that necessary to support the fuel cycle of power reactors, located within the Community, having an installed capacity of 35,000 megawatts electric. Additionally, 25,000 kilograms of contained U^{235} would be made available for other than power purposes. The maximum quantity of contained U^{235} expected to be required to fuel this 35,000 megawatts of power over the life of the newly amended Additional Agreement for Cooperation, together with that required for other than power purposes, is about 583,000 kilograms, or 91 million separative work units.

EXPLANATION FOR "MEGAWATTS OF POWER" TERM

Before discussing other aspects of this proposed legislation, I want to explain why the Commission is now expressing enriched uranium ceilings for power purposes in terms of megawatts of power which may be fueled, rather than in terms of kilograms of contained U^{235} , as we have done in the past. We have adopted this approach concur-

rently with our revised policy with regard to agreements for cooperation; that is, the agreements no longer constitute a commitment to supply enriched uranium—or the equivalent enrichment services—to foreign customers.

Instead, these ceiling quantities in agreements for cooperation now serve only to set an upper limit on the amount of enriching services which may be provided to the cooperating nation or group of nations. The actual commitment to supply enriched uranium does not occur until the time of executing the specific toll enrichment services contract. Since the agreement for cooperation does not constitute a commitment to supply, it is no longer necessary that the overall ceiling in the agreement be expressed in terms of precise amounts of U^{235} . However, since the megawatts of power to be fueled actually determine the amount of enriched uranium to be supplied, it is possible to convert the megawatts to kilograms of U^{235} . The latter is calculated by making additional assumptions regarding the fuel cycle of the reactors expected to be involved. I will discuss this later in my prepared statement.

This method of expressing the ceiling quantities in terms of megawatts has the following advantages for the supplier of enriched uranium:

First, installed power capacity is, in any event, the basic assumption from which either separative work or U^{235} requirements must be derived;

Second, a megawatt ceiling is simpler and more readily understood;

Third, since domestic enrichment requirements normally are expressed in terms of the number of megawatts of installed capacity by a given date, expressing the foreign ceiling in comparable terms will facilitate comparison between foreign and domestic requirements;

Fourth, a megawatt ceiling will avoid the necessity of having to make relatively minor adjustments resulting from such factors as a change in the type of power reactor planned at the time the agreement is negotiated and from technical revisions in the assumed fuel cycle; and

Finally, a megawatt ceiling will make unnecessary some detailed AEC internal recordkeeping, without compromising in any way the data needed for safeguards purposes.

FIRST USE OF TERM IN AGREEMENT

The first agreement for cooperation submitted to the Joint Committee containing a ceiling on transfers of enriched uranium expressed in megawatts was the recent amendment to the Japanese agreement. This amendment has completed its statutory 30-day waiting period before this committee and we anticipate that it will be brought into force as soon as the Japanese side advises us that it has completed its internal procedures.

Having discussed the reasons for altering the method for expressing the ceiling quantities I would now like to describe the manner in which the AEC's new contracting policies for uranium enrichment services relate to the proposed increase in the European Community's ceiling.¹

¹ The background of AEC's new contracting policies for uranium enriching services is set forth in the record of hearings entitled "Proposed Changes in AEC's Contract Arrangements for Uranium Enriching Services." These hearings were held on March 7, 8, 26, and April 18, 1973, and were conducted by the Subcommittee on Energy of the Joint Committee on Atomic Energy.

Under the AEC's new policy, customers for such services will sign long-term firm commitment-type contracts 8 years in advance of the initial delivery of enriched uranium. Between now and June 30, 1974, there will be a transition period during which all customers who have not already signed contracts, and who will need enrichment services within the next 8 years, are expected to sign the new type of contract. In the case of our customers in the Community, the proposed ceiling increase to 35,000 megawatts is necessary to cover contracts which must be executed during this transition period.

Our projections indicate that the existing AEC enrichment capacity, including improvements and preproduction, will permit us to execute contracts covering the entire 15,000 megawatt increase. However, I should again like to reiterate that enactment of this new ceiling, when taken in conjunction with the recent amendment to the Additional Agreement for Cooperation with Euratom, does not represent an obligation on the part of AEC to supply the corresponding enrichment services. Rather, it authorizes the AEC to contract with the Community within that ceiling to the extent that enrichment capacity is actually available at the time a contract is desired.

EFFECT OF BILL ENACTMENT ON PRESENT SITUATION

At this time, by the use of three viewgraphs, I should like to briefly summarize the effect which enactment of these bills will have on the present situation with respect to the supply of U²³⁵ to Euratom:

This first viewgraph shows the present situation. Of the presently authorized 215,000 kilograms of U²³⁵ ceiling, we have committed under existing contracts all but about 20,000 kilograms. Thus, less than 10 percent of the presently authorized ceiling remains uncommitted. This existing ceiling will cover total installed nuclear power capacity of about 20,000 megawatts, but is insufficient to fuel all of the reactors involved over the duration of the Agreement for Cooperation, which extends to the end of 1995.

[First table follows:]

ENRICHING COMMITMENTS UNDER EXISTING EURATOM AGREEMENT CEILING
COMMITMENTS UNDER EXISTING CEILING

	Kg U ²³⁵	SWU (million)
Under contract.....	195,000	30.9
Remaining.....	20,000	3.1
Total commitments.....	215,000	34.0

Note: Ceiling—215,000 kg U²³⁵ (Approximately 20,000 MWe).

Mr. FLAHERTY. The second viewgraph shows the approximate additional maximum amounts of enriched uranium—some 368,000 kilograms—and corresponding amounts of separative work, which might be transferred if the proposed 15,000 megawatt ceiling increase is enacted. This includes about 140,000 kilograms of U²³⁵ which would be necessary to permit us to extend a number of contracts which have been entered into under the present 215,000-kilogram ceiling, but which do not extend through the full term of the Additional Agree-

ment for Cooperation. It also includes the 25,000 kilograms of U²³⁵ for nonpower programs, such as the fueling of research and test reactors which would also be authorized for transfer under the bills. Amounts of U²³⁵ to be used in nonpower purposes are not readily expressed in terms of megawatts of electric power. Therefore, this bill continues to express the ceiling on transfers of U²³⁵ for nonpower purposes in terms of kilograms of contained U²³⁵. If the maximum additional amount of approximately 57 million separative work units authorized for transfer by this proposed ceiling increase ultimately were to be purchased by the Community, it would represent revenues of over \$2 billion, on the basis of a charge of \$36 per separative work unit.

[Second table follows:]

MAXIMUM ENRICHING REQUIREMENTS UNDER PROPOSED EURATOM CEILING
ADDITIONAL REQUIREMENTS UNDER PROPOSED CEILING.

	Kg U ²³⁵	SWU (million)
Complete fueling of initial 20,000 MWe ¹	140,000	22
Fuel for additional 15,000 MWe.....	203,000	32
Nonpower requirements.....	25,000	3
Total additional.....	368,000	57

¹ To extend fuel provision for all plants under present ceiling through life of agreement.

Note: Ceiling increase—15,000 MWe.

Mr. FLAHERTY. The final viewgraph summarizes the approximate maximum quantities of enriched uranium which could be supplied to the community under the revised ceiling of 35,000 megawatts—a total of 583,000 kilograms of U²³⁵ or, equivalently, some 91 million separative work units over the life of the agreement.

[Third table follows:]

SUMMARY OF ENRICHING REQUIREMENTS UNDER EXISTING AND PROPOSED EURATOM CEILINGS

	Kg U ²³⁵	SWU (millions)
Commitments under existing ceiling.....	215,000	34
Maximum requirements under proposed ceiling increase.....	368,000	57
Total.....	583,000	91

Mr. FLAHERTY. Action on these bills to increase the ceiling under the Euratom Cooperation Act is becoming increasingly urgent. As indicated earlier, our revised uranium enrichment contracting policy makes it mandatory that a large number of contracts with Community customers, covering initial deliveries through fiscal year 1982, be executed within the next 12 months. Already, the Euratom Supply Agency has received from users in the member states specific requests for contracts covering reactors having a total installed capacity of over 5,500 megawatts, for which initial deliveries of enriched uranium will be needed in the very near future. Additional requests for enrichment contracts are expected momentarily.

In order that we may continue to meet the needs of customers in the Community—which has joined with the United States in making a ma-

for commitment to the use of nuclear power—this legislation is needed on an urgent basis.

This ends my prepared statement. I appreciate the opportunity which you have given me to appear before you today. My colleagues and I would be pleased to respond to any questions which you may have.

Thank you.

DIFFERENCE BETWEEN ENRICHED AND CONTAINED URANIUM

Senator MONTROYA. Will you please first explain the difference between enriched and contained uranium, if there is a difference. I am new on the committee and I am trying to learn these terms.

Mr. FLAHERTY. It is a complex subject, I must agree. We do express it in this way—we have several terms that apply. Let me by way of example talk about a typical 1,000-megawatt reactor and requirements over its lifetime for uranium and state it in the various units that we are discussing.

Of course, this depends finally on what tails assay we use and the exact type of reactor it is. Such a reactor uses a total of 815,000 kilograms of uranium over a 30-year period. This would contain about 15,500 kilograms of net adjusted U^{235} . Where this net adjusted amount comes from is this: Natural uranium has 0.7 percent U^{235} as it comes from the ore. In the diffusion plants we boost this enrichment to a number that in the average reactor is about 2.6 percent U^{235} . The term kilograms of net adjusted U^{235} —or contained U^{235} —is the difference in the number of kilograms of U^{235} in that same product which was provided by the customer as feed for the enrichment service. I am sorry for such a lengthy response to such a short question.

EUROPEAN USERS OF ENRICHED URANIUM

Senator MONTROYA. What countries will utilize this uranium?

Mr. FLAHERTY. This uranium is to fuel reactors located in Germany, France, the Netherlands, Belgium, and Italy.

Senator MONTROYA. What about the new members?

Mr. FLAHERTY. I am not aware of the requirements in the United Kingdom or Ireland or other new member countries. It is quite possible that in the future there will be some requirements.

STATUS OF COMMITMENTS WITH UNITED KINGDOM

Senator MONTROYA. Do we not have some commitment with the United Kingdom?

Mr. FLAHERTY. We do have some small commitments with the United Kingdom under the present bilateral agreements which will some time in the future have to be changed to be included with the Euratom Supply Agency.

Senator MONTROYA. Under the ceiling you are asking, are you taking into consideration the possibility that you might merge the contractual obligations with the United Kingdom with the Euratom Community?

Mr. FLAHERTY. I will ask Mr. Hoyle to speak to that, Senator Montoya.

Mr. HOYLE. This amendment would include enrichment services which might be supplied to the United Kingdom under the U.S.-Euratom agreement. However, for the present time at least the United Kingdom would have the option of obtaining material either under their bilateral agreement or through the European Community. The amounts, as Mr. Flaherty has pointed out, currently required by the United Kingdom and, as far as we know, which will be required in the immediate future, are quite small and for research and test reactors and not for power reactors.

Mr. FLAHERTY. We will supply for the record the actual amounts involved. As you know, the United Kingdom program is based on natural uranium reactors not requiring substantial enrichment.

[Information subsequently submitted follows:]

To date, the AEC has supplied or is committed to supply the United Kingdom with 19,194 kilograms of uranium containing about 1,630 kilograms of U-235, for an average enrichment of about 8.5% U-235. Of this total, only 327 kilograms of uranium containing about 111 kilograms of net adjusted U-235 has been provided under enriching services contracts; the remainder were made available under straight sale contracts.

VALUE OF EURATOM PURCHASES

Senator MONTOYA. I believe it was stated that if Euratom purchases the maximum material covered under this increase, this would represent revenues of about \$2 billion.

Mr. FLAHERTY. That is correct, sir.

Senator MONTOYA. What is the dollar value of the enriched uranium that has already been sold to Euratom?

Mr. FLAHERTY. Approximately \$1.1 billion has been contracted for under the present ceiling, and to that would be added the \$2 billion for a total of \$3.1 billion.

CURRENT PRICE OF ENRICHED URANIUM

Senator MONTOYA. Now you use the price of \$36 for enriched uranium. Doesn't the present market information indicate it is closer to \$38?

Mr. FLAHERTY. Under the present situation on pricing within the Commission I believe the \$36 still does reflect the cost recovery which we are directed to achieve under the Atomic Energy Act. I might ask Mr. Quinn, who is in charge of that program, if he would like to add to that statement.

Mr. QUINN. Under the new contracting arrangement, Mr. Chairman, the Commission will be requiring firm commitments of its customers. This is in contrast to our previous arrangements which were requirements-type contracts. Under the requirements-type contract there is a greater risk on the supplier because of the uncertainty of demand. For that reason the Commission has established this differential in charge. The \$36 applies to all new fixed commitment contracts and the \$38.50 will apply to services provided under the old requirements type contracts.

Senator MONTOLA. In the fixed commitment contracts it is my understanding that you enter into a contract for a number of years and that you would only charge \$36 or \$38, whatever the case may be, and there is no provision in the contract to raise the price as you go along, depending on the increment in overhead cost and in the cost of producing the material?

Mr. QUINN. The contracts do provide for adjustments in the change, Mr. Chairman, as may be necessary to assure recovery of Government costs.

RECOVERY OF PRODUCTION COSTS

Senator MONTOLA. What monitoring do you provide in order to assure for yourself and the Government that you are recovering the actual cost of production?

Mr. QUINN. This is reviewed frequently within the Commission as any changes occur which would affect our costs. We are currently in the position where we are averaging costs over the period through 1980 to develop our charge. This is because during that period we are engaging in a considerable amount of preproduction beyond immediate sales. In order to do this we have to average our costs over a period of time that would take into account interest on that preproduction.

Senator MONTOLA. Can you safely do that over a long period of time in view of the inflationary spiral that is setting in?

Mr. QUINN. We can do it with the proviso that we are free to make adjustments as may be necessary, and that flexibility is available.

FOREIGN ENRICHMENT PROGRAMS

Senator MONTOLA. Could you summarize for us the enrichment efforts of other countries and how they may impact projected U.S. sales to Euratom, Japan, and other nations?

Mr. FLAHERTY. I might ask Mr. Hoyle to speak to that subject.

Mr. HOYLE. Mr. Chairman, the current situation is that the United States has, until now, been almost the exclusive supplier of enrichment services to the remainder of the free world. Several years ago, the Soviet Union announced its willingness to supply enrichment services to the West. They have become increasingly aggressive in their sales effort, although to date there has been only one actual sales contract signed. In addition to this, there is a tripartite effort on the part of the Dutch, the Germans, and the United Kingdom to develop the centrifuge under the organization known by the acronym of URENCO. They have placed several small pilot plants in operation, and they expect to have a modest production capability in the late 1970's.

The French, who have a very small gaseous diffusion type plant dedicated principally to production for their military program, have announced and are actively pursuing a program to build a diffusion plant in Europe. Also, the Japanese have a longer term effort and are joining at least in studying several of these alternatives for supplying enrichment services to Japan.

I believe that represents the major efforts of other nations so far as enrichment is concerned.

UNCOMMITTED BALANCE UNDER PRESENT CEILING

Senator MONTROYA. The presently authorized ceiling is 215,000 kilograms. You indicated that all but 20,000 has not been committed. When will this remaining balance be committed?

Mr. FLAHERTY. That remaining balance could be committed almost momentarily. As I indicated the supply agency, Euratom, does already have a request for 5,500 additional megawatts which would more than use up that ceiling.

Senator MONTROYA. What is the delay in writing those requests into a contract?

Mr. FLAHERTY. The delay is the lack of ceiling in which to operate.

Senator MONTROYA. Do you have other instances where contracts are awaiting the passage of this legislation so that you can start negotiating?

Mr. FLAHERTY. No, sir. I think at the moment Euratom is the only case in which we are being held up by the necessity of legislation.

LIKELIHOOD OF ADDITIONAL CEILING INCREASES

Senator MONTROYA. Will the increased quantities be sufficient for the duration of the Euratom agreement, or do you expect additional increases? If so, what is the order of magnitude of such increases?

Mr. FLAHERTY. Mr. Chairman, forecasting nuclear power growth is a tricky business. We would anticipate that it is very likely between now and 1995, which is the length of time which our agreement runs, there will be requirement for additional commitments if nuclear power grows as we now expect it to. I am not prepared at the moment to look that far into the future and say what it will be, but I think, to give you a very straight answer, it is quite likely that the new ceiling is not sufficient for the entire period.

INTEREST OF PRIVATE ENTERPRISE IN URANIUM ENRICHMENT

Senator MONTROYA. Do you anticipate that private enterprise will start producing this enriched material?

Mr. FLAHERTY. We have had a fairly active program for a little over a year now with several private United States firms who have come in and gained access to the technology and are now considering going into the business. Let me say that I am hopeful that in the course of the next 12 months one or more of these groups will come in with a firm expression of intention to go ahead. I am fairly confident, but on the other hand I am not certain, that this is going to be the case.

Senator MONTROYA. You don't expect one single company to take the risk of working out the kind of enterprise that is needed to service the needs as they might arise in the future, do you? It would probably require a consortium, would you not say?

Mr. FLAHERTY. That is quite right, Mr. Chairman. All of the companies with whom we have held discussions so far have indicated that indeed they would be members of a consortium rather than a single company. There are very few companies large enough to take this kind of a risk.

ESTIMATED COST OF A NEW ENRICHMENT PLANT

Senator MONTROYA. Give me the economics—what it takes—to develop an appropriate, serviceable complex similar to the different plants now under your domain.

Mr. FLAHERTY. I think I might ask Mr. Quinn to speak to the question of the economics.

Mr. QUINN. Are you referring, Mr. Chairman, to the economics of—

Senator MONTROYA. How much capital outlay will it require to put a new plant into operation?

Mr. QUINN. We have made studies on the basis of a plant size of $8\frac{3}{4}$ million separative work units per year. In approximate figures the capital investment for a new plant of that size will likely run in the order of \$1.5 billion.

Senator MONTROYA. That is almost prohibitive for private industry, is it not?

Mr. QUINN. It is a very heavy capital drain and would pose a problem for any single company.

AMORTIZATION OF INVESTMENT

Senator MONTROYA. Because the competition will be setting in in the next few years and you don't know whether they will be afforded the opportunity to amortize their investment, isn't that right?

Mr. QUINN. Their opportunity to amortize the investment will be dependent on the type of contracts they enter into for providing the services from the plant. Now the Commission under its new contracting policy, for example, is requiring 10 years of firm commitments. So this will go a substantial way toward amortizing the investment if the government should have to build a new plant.

Mr. FLAHERTY. I might say, Mr. Chairman, that we do understand several of the consortia who are now considering this are in the process of approaching U.S. utilities customers and asking for firm commitments, and in some cases are having some success.

COST OF ELECTRICAL POWER

Senator MONTROYA. Since you mentioned the utility customers, if you will permit me to go back, with respect to the \$36 price, doesn't half of this represent electrical energy?

Mr. QUINN. Approximately, that is right, yes.

Senator MONTROYA. That is not going to improve?

Mr. QUINN. On the basis of the experience we have had over the last several years we can look forward to further increases in the cost of electric power which would force our charge higher, that is correct.

Senator MONTROYA. Now give me some illustration of how much electrical energy we are using in order to manufacture the end product here? Give me some statistics on that because there is an electrical energy shortage in this country.

Mr. QUINN. Yes.

At the present time our plant capacity, if it is operating fully, will take something like 6 million kilowatts of electricity. At the present time we are only partially loaded. We are running between 3 and 4 million kilowatts.

EFFECT OF CEILING INCREASE ON U.S. COMMITMENTS

Senator MONTOYA. Do I understand that the United States is committed to sell enriched material to Euratom nations until 1995?

Mr. FLAHERTY. As I have tried to stress in my prepared statement, Mr. Chairman, this new agreement does not represent a commitment. It represents a ceiling under which we can make commitments in individual contracts with utilities through the year 1995. We have stated to this committee in testimony prior to this, I believe by Commissioner Larson, that the Commission would not enter into commitments beyond its capability to produce material.

Representative HOSMER. Whatever that may be?

Mr. FLAHERTY. Whatever that may be, Congressman Hosmer. I interpret that as meaning the capability we have with the improved plant represented by installation of CIP-CUP, plus, of course, the preproduction which we have in stock and any further adjustment entails assay.

CUSTOM ENRICHMENT: IMPACT ON U.S. INVENTORIES

Representative HOLIFIELD. May I ask a question, Mr. Chairman?

Senator MONTOYA. Certainly.

Representative HOLIFIELD. I am concerned about the furnishing of this enriched material from a number of standpoints. One, is it predicated on custom enrichment, or is it predicated on our furnishing yellow cake out of our inventory?

Mr. FLAHERTY. This is a toll enrichment transaction, Mr. Holifield, custom enrichment.

Representative HOLIFIELD. Custom enrichment.

Mr. FLAHERTY. Yes.

Representative HOLIFIELD. In other words, it is not cutting down on our supply of enriched material or our supply of yellow cake?

Mr. FLAHERTY. As you know, we are at the moment operating a plant in what we call a split tails mode. Our supply of uranium in the Government stockpile is being utilized for this purpose. I believe that under our present method of operation we expect this stockpile will be depleted about 6 years from now. So, some small portion of this could be construed to wind up in this transaction.

Representative HOLIFIELD. You see, this is what I am worried about. If we are dipping into our supply of enriched material and selling it, we are in effect going into our own bank of assets. That material that we have in there, whether it be in the form of enriched units or yellow cake, was acquired at bargain prices in relation to today and the future. It was processed with electrical power which costs possibly half of what we are paying.

The basis for my worry is that we are going to get ourselves in a position where for the temporary relief of our budget balancing problem we will be selling bargain material; a bargain from the stand-

point that it was produced at a lower cost than we can produce replacement material at this time, and probably at half the price of the future.

If that be true, what we are doing is really spending our assets for a temporary gain in dollars and the bill is going to rebound against us in less than a decade because of the increased need for us to have energy from uranium. And if we don't have the uranium at as cheap a base as we can possibly get it, we are going to have to buy Saudi Arabian oil at maybe three or four times the cost that we have now. I note that Saudi Arabian oil has gone up from \$1.50 a barrel to \$3 in the last year, and I would not be surprised to see it go up to \$6 in the next few years. I am wondering if we are not pennywise and pound foolish in making this commitment, both from a financial balancing standpoint and also from the standpoint of a predictable need for our domestic reactor owners.

This is a composite of what I am worrying about. I am wondering if we are looking at this thing for the long pull, and I am wondering if we are giving enough consideration to the protection of our own people in supplying them energy, the electrical kilowatts they are going to need from an indigenous, owned base. That is what is worrying me.

ONLY 20,000 KILOGRAMS REMAINING

I note that your charts show that we only have remaining 20,000 kilograms. That could disappear pretty quickly. Then what happens if we have a surge of domestic need and we do not have the CIP-CUP installed to the point where we can supply that need? Or what happens if we have to take new power contracts at much higher rates, thus making the end product much higher than, say, the price of \$36.

Those are a number of my observations mixed with several questions, but I had to put it that way to show you what is in my mind.

Mr. FLAHERTY. Mr. Holifield, I think you have made a very clear statement of what is in your mind. I think you will recognize there is no simple response to the question you are asking. I might make some observations of my own on the same subject.

From an economic standpoint—a purely economic standpoint—I believe that our analyses have demonstrated to our satisfaction that holding on to this uranium concentrate asset, which in effect we are paying interest on because of course the Government is in debt is not good business. Using it now in the diffusion plants does make better economic sense than letting it sit there and not earn its keep.

Representative HOLIFIELD. In earning its keep have you balanced off the cost of this material at the time it was produced. I am talking about yellow cake now—and the cost of changing that into enriched units at present day rates, and what you paid then and the depreciation of the dollar that is occurring where you have a commodity here that will increase in value while your dollar you are getting back is being sharply reduced in value because of the devaluation and inflation that is occurring?

Mr. FLAHERTY. Mr. Holifield, I believe that our analyses will still indicate this. I will be delighted to try to supply more detail to you on the subject.

[Information later supplied follows:]

The following table demonstrates the value of AEC excess U_3O_8 stock for the years 1973, 1980, and 1985.

VALUE OF AEC EXCESS U_3O_8 STOCK

[In 1973 dollars]

Year	Price projection dollars per U_3O_8	Value in 1973 at 5½ percent discount rate, dollars per pound	Value in 1973 of 50,000 tons of U_3O_8
1973.....	6.70	6.70	670,000,000
1980.....	8.50	5.83	583,000,000
1985.....	10.00	5.25	525,000,000

The AEC is presently using some government-owned uranium as diffusion plant feed to supplement uranium supplied by toll enriching customers according to the split tails concept. As pointed out by Dr. Schlesinger in testimony before the Joint Committee on Atomic Energy on March 7, 1972, the use of AEC feed stocks in this way is "trading a resource that is in relative surplus, feed material, for something that is in short supply, relatively speaking, to wit, enrichment capacity and electric power. By so doing, we put great value on our surplus stocks, postpone a decision and provide enriched material through this substitution process."

BALANCE-OF-PAYMENTS BENEFITS

If I may make an observation of my own now, as much as we would like we can't be an island in this whole world energy situation. For example, supplying this much capacity 35,000 megawatts, through nuclear power to the European communities will actually represent an equivalent savings of 350 million barrels of oil that they will not have to import annually from the Middle East in competition with us. You see that is one very strong plus.

Our energy economies I think are completely interlocked.

Now one way of looking at the operation of the diffusion plants, where we are selling enriched uranium to these foreign nations, is that we are in fact turning coal into oil. The principal ingredient that we are using up in running the diffusion plants is coal. This is the source of our electricity. And we are receiving balance-of-payments money which will help us meet the very high price we must pay for Arabian oil.

I agree with you it is going up in price. I am sorry that it is necessary for us to import the oil, but I think for the next few years this is what we are going to have to do.

By the way, I think you know that we in the Atomic Energy Commission are very confident that coal liquefaction to produce synthetic crude is a very real possibility, and one by the way which we would like an opportunity to work on. But until that technical development comes along, I think this is one of the best ways of turning coal into oil that I know.

That again is an observation rather than an answer.

IMPACT OF SPLIT TAILS

Representative HOSMER. Will the gentleman yield?

Representative HOLIFIELD. Yes.

Representative HOSMER. You mentioned that because of split tails mode of operation there might be some cost in our reserves in doing custom business for overseas plants. However, that is a totally relative matter I believe inasmuch as you take the tails and strip them to where they are unsplit at some later date. Therefore, you wash out that difference.

Mr. FLAHERTY. That is quite correct, Mr. Hosmer. If we in the future find that it is economic to take the three-tenths tails down to two-tenths or some even lower number, we are free to do so. That is indeed the logic on which we felt the split tails mode makes sense.

ORIGIN OF GOVERNMENT'S YELLOW CAKE SUPPLY

Representative HOSMER. Now the supply that we keep talking about that the Government has of UF₆, or yellow cake I should say, is that which we acquired while uranium was nationalized. Is that not correct?

Mr. FLAHERTY. Mr. Quinn, I believe, is more familiar with the history of the actual procurement.

Mr. QUINN. It was acquired, Mr. Hosmer, when our primary needs were for defense. It was produced by private companies in the mining and milling business.

Representative HOSMER. The private companies could not own this so the Government had a purchase program?

Mr. QUINN. The private companies could own natural uranium but they were prohibited from owning enriched uranium. So all fuel was leased by the Government.

RELATIONSHIP OF STOCKPILE TO FUTURE URANIUM DEMAND

Representative HOSMER. Now the stockpile which we have, what can you tell us about this in relation to the extent of the demand for uranium which will occur in the 1980's and 1990's?

Mr. QUINN. The magnitude of the stockpile is determined by looking at the total quantity we have on hand and adjusting that for anticipated Government needs in the foreseeable future.

Representative HOLIFIELD. Both domestic and under international commitment?

Mr. QUINN. No, I am really talking about Government needs to take care of Government programs, and this would include any cases where we are selling enriched uranium directly. For example, under our very early agreements with Euratom I believe before we engaged in toll enriching, the fuel is supplied to their power reactors on a straight sale basis. But looking at the quantity of material that is uncommitted as far as that application is concerned, and not expected to be needed to support Government programs, today the number is something like 60,000 tons of U₃O₈.

Now under the split tails mode that will probably end up distributed between domestic and foreign customers, in something like a 60-40 split. Maybe on the order of 25,000 tons of this might find its way to foreign customers.

Now I think these figures should be looked at in the context of what requirements are going to amount to, say, in about 1990. In that period of time our projections indicate that just domestic requirements are going to be on the order of 120,000 tons per year.

Representative HOSMER. These are not requirements by the U.S. Government?

Mr. QUINN. By domestic civilian power.

Representative HOSMER. They will have to go out and get that tonnage?

Mr. QUINN. That is right.

Representative HOSMER. And then they will go to someone, whether it is the AEC at that time or some successor enriching organization, to get their product enriched; is that correct?

Mr. QUINN. Right. The point I am trying to make is that the amount of surplus Government stocks becomes quite small when one looks at the requirement, say, through the remainder of the century.

Representative HOSMER. That is a fact of life in any event.

Mr. QUINN. That is right. I guess what I am saying is that it does not provide a substantial degree of insurance as far as domestic supply.

Representative HOSMER. It is not supposed to.

Mr. QUINN. No. That was the question Mr. Holifield was raising.

Senator MONTOYA. Will you yield at this point to me?

Representative HOSMER. Yes.

ADEQUACY OF URANIUM RESERVES TO SUPPORT GROWTH OF NUCLEAR POWER

Senator MONTOYA. Now this disturbs me. The availability of natural uranium on the present basis will relegate us to a position of de-emphasizing our nuclear capability, will it not?

Mr. QUINN. I hope it will not prove that way, Mr. Chairman, I think on the basis of known reserves today certainly they are inadequate to support our projected civilian power program. On the other hand they are sufficient to supply needs through the next 8 or 10 years. During that period of time we would expect that the industry will be out exploring for additional uranium, developing those resources and bringing them into production.

INCENTIVES FOR EXPLORATION AND DEVELOPMENT

Senator MONTOYA. What are we doing to encourage the exploration and development?

Mr. QUINN. Well, the encouragement at the moment is the commercial incentive to supply this very large market which unfortunately is a number of years away. But beginning in the late 1970's the quantities become quite large. By the end of this decade we will need something like twice the capacity of production in this country that exists today. There is a very strong commercial incentive for the industry to go out and find uranium.

U.S. POLICY ON IMPORTATION OF FOREIGN URANIUM FOR DOMESTIC USE

Senator MONTROYA. Well, the American Mining Congress, under date of June 15, sent a communication to Chairman Dixy Lee Ray. One of the recommendations in this communication was "to eliminate present uncertainty concerning future Government import policy, to provide a sound basis for uranium investment and purchase decisions and to encourage immediate increases in exploration and development. In order to accomplish these objectives the Government should promptly announce that uranium imports will not be permitted prior to 1982 at the earliest.

Affirmative action for any imports to begin in 1982 should be deferred until the ability of the domestic industry to supply possible 1991 demand can be more accurately determined than it can be at present. The domestic industry's capability should be thoroughly assessed in 1978 as a basis for such determination."

Do you know about that recommendation and what has been the reaction to it?

Mr. QUINN. I am familiar with the letter, Mr. Chairman. I can't speak for the reaction at the moment because it has only recently been received.

The matter of removal of the restriction on domestic use of foreign uranium is something that the Commission has had under study for a number of years. In March of last year the chairman testified that we expected within a 2-year period to reach conclusions on that and appear before this committee with a proposed program under which this restriction could be gradually removed. The committee will be involved in any such decisions since it requires a change in the Commission's criteria for uranium enrichment.

IMPACT ON ENRICHING FOREIGN SOURCE URANIUM

Senator MONTROYA. Within this same context, it is my understanding that when you are called upon to perform services for enrichment purposes, some of the foreign nations bring in their uranium ore and, necessarily, the cost of foreign uranium is cheaper than that used here. Now is that true?

Mr. QUINN. Most of the transactions with our foreign customers have involved the enrichment of foreign source uranium which is then exported out and the enriched product used in these foreign reactors. There have, however, been some small sales of domestic uranium to foreign countries.

Senator MONTROYA. The point I am trying to make is that when they bring in their own raw material here and it is cheaper, then that creates a competitive—

Representative HOSMER. If I may correct the gentlemen. Uranium enriching is a service. They just bring the uranium here and the AEC enriches it. It is in no sense in competition with any of our raw uranium. They can take their tails back. As a matter of fact, I gather that they just abandon them because it is too expensive to drag them back.

Senator MONTROYA. The point I want to make is this. They can get the finished product cheaper than our domestic users can. That is the point.

Representative HOSMER. That is their business. They have their own European utilities. They are not in competition with U.S. utilities.

Representative HOLFIELD. I am not sure about that statement, Mr. Chairman. This is complicated. I certainly am not going to say that your statement is wrong. This is one of the factors that has bothered me. Take, for instance, our plant load factor. Running foreign material with domestic material through our plants may, in effect, give us a cheaper per unit end result because of the lower factor of the plant than we would otherwise have if we just had our own material going through there. I would much rather have it on a custom service, doing a custom service for these people on their own uranium, rather than having us furnish the uranium from what I believe will be a dwindling supply of rich ore, and going into the poorer ores, which will automatically take more kilowatts of our electrical energy to get out the same unit of enriched material.

This is so complicated that I really don't know what judgment to put on it, myself. This is what I was trying to develop a minute ago. I think we have an international commitment, particularly to these people where we have sold reactors, where American companies have sold reactors, a moral, if not a legal, commitment, to furnish them fuel.

If we furnish foreign customers from our own material at the same price that we furnish it to our own people, it is in my opinion a bargain. It is going to be much more of a bargain when you go into private enrichment companies and they jump the cost of an enriched unit about 40 percent because of the profit, taxes, and other items that will enter into a private enrichment company doing the work in the place of our doing it in a Government facility which does not pay taxes, and which has more or less been amortized on the basis of furnishing our defense and civilian needs. This thing is so complicated that I don't understand, myself, exactly what the advantages are that we are getting other than the temporary advantage of the influx of dollars.

But there is an outflux in the custom enrichment; there is an outflux of dollars worth of kilowatts. In other words, we have to buy energy at an ascending price from these utility plants in order to enrich this material. I am assuming we are making some profit, but very little profit on it, and I just don't know how to balance the economics of it. It has not been explained to me so that I can understand it.

VALUE OF ENRICHING SERVICES TO U.S. BALANCE-OF-PAYMENTS POSTURE

Representative HOSMER. May I say this. Let us consider the TVA hydro—some of the hydroelectric power they are using. You can't store electricity, so every kilowatt you use to enrich uranium you are turning into a product you can export for money. If you use coal or oil it is costing you energy to do this job, but you are getting your money back. It is energy that is being put to productive use.

What is the most troublesome part of this whole situation is that the sale of separative work services in the overseas market by 1988 will amount to about \$1.5 billion a year or more if you assume that you are pricing it at \$50 a separative work unit. That figure may not be correct—it is somewhere in the billions.

Now, somebody is going to get that business. If the somebody is the United States, it is going to be of great benefit to our foreign exchange picture. It will give us some of the funds we need to buy some of the oil we have to buy for other purposes.

If on the other hand we fail to capitalize on that market we lose an asset that is quite valuable. So in terms of national interest we have to make a very careful judgment as to whether we want to go out after this large and continuing business. If we do, and decide it is in the national interest, then we have to structure the way we produce additional increments of uranium enrichment in this country, the next production capacity. We have to do that in such a way that we can be competitive, more than competitive, competitive enough to get 80 percent of this overseas market.

URANIUM ENRICHMENT: A SALE OF SERVICES

Senator MONTROYA. I am trying to develop the economics of this problem because right now the United States has a complete monopoly on the sale of this enriched material. The judgment that I was trying to reach on the basis of the questions I was asking pertain to whether or not it is fair to sell to our domestic users at a price higher than the price we sell to foreign users.

Representative HOSMER. We are not selling uranium. We are selling services at \$36 or some price for a separative work unit. That is being sold to everybody at the same price.

Senator MONTROYA. We are selling services to the domestic user too because that goes into the price structure.

Representative HOSMER. That is correct. Everybody is paying the same price for the service. It is not a product. It is a service. You have to get that concept through your mind in order to understand what we are talking about here and what we are dealing with. We are dealing with a service just as if you went to the doctor to have him look you over, you are dealing with a service.

Senator MONTROYA. Congressman Hosmer, I am openminded about this. I am just trying to learn the economics of it.

Representative HOSMER. What I am trying to tell you is that they bring you something that somebody works on.

Senator MONTROYA. You have apparently made a study of it. I can point to other situations along the Mexican border where some of our manufacturers take something across the border and they manufacture it cheaply and then they come back with finished goods and are able to compete in the U.S. market against domestic producers.

Representative HOSMER. We are trying to do the work here in the United States so that we can compete better against overseas companies. That is the whole gimmick. This is the other side of that coin. This is our chance to get the business.

Chairman PRICE. It would be very helpful to get the witnesses point of view on the subject in the record.

Senator MONTROYA. Yes, and I would also like for you in the process to take into consideration this aspect which Congressman Holifield didn't mention. That is, you mentioned that in the present inventory we have uranium that was enriched some time ago. Understandably, the Government had to borrow a lot of money during those years to

pay for this enrichment process, and what the Government paid then represents part of the national debt on which interest has been paid. Is that investment, plus the interest that we had to pay on that money, being considered in arriving at a price structure representative of the actual cost?

Mr. FLAHERTY. All of the costs of the enterprise are taken into account, Senator Montoya. I might say, relating that stockpile to one of your earlier questions, that the mining interests of the United States have felt that the existence of this large Government stockpile was a discouragement to their further hunt for uranium in this country, and they have urged us to hold it off the market. I think they have agreed with us that the best way to dispose of this, without disrupting the domestic uranium market, is just the way we are doing it, through the split tails operation in which we are in effect feeding it gradually to all the customers including the foreign customers.

Senator MONTROYA. Congressman Price made an observation. Can you answer that?

Mr. FLAHERTY. The comment that I might make is that I believe it is quite correct, as several members of the committee have stated, that primarily what we are selling is a service. We are providing an enrichment service. Where this uranium that is involved in the service is destined to be used in a foreign reactor it is most likely to come from foreign uranium sources, although sometimes they buy it in the United States. We are charging all of our customers, domestic and foreign, the identical sum for this service, so there is no discrimination one way or the other. I certainly, myself, do not have a fixed view. As you know, you can debate the question of whether in fact the embargo we have against the use of foreign uranium in domestic reactors is an appropriate thing or not.

DEVELOPMENT AND USE OF DOMESTIC NATURAL RESOURCES

Representative HOLIFIELD. It is like the embargo of oil we have experienced over the years. We have been burning up our own oil because the people who own the oil in the United States didn't want any competition from foreign oil. So we burned our oil. Now we are paying the price for it because our oil supply has declined.

The question might be asked, would we have been better to have imported cheap uranium and left our uranium in the ground? But, of course, there you came up against economic interests of the miners in the West where they find this uranium, and, as you have said, we had this stockpile which was hanging over the market and it was controlled by a monopoly owner, the Government. So the mining interests claimed that as long as that was there, that if it came in competition with them, they could not operate their own local mines profitably. I think the committee recognized that.

We did take into consideration their plea and said we have this billion dollars worth of yellow cake here; we can't flood the market with it; we will let that gradually go into the market. And in order to take advantage of the load factor in our enrichment plants, we will allow these people to bring their uranium in and we will charge them on a nondiscriminatory basis. Incidentally, this is a benevolent practice on the part of our Government because the Saudi Arabians will charge us what the market will bear for oil. We are not doing it.

ATOMS FOR PEACE

This is the so-called atoms for peace program that we put into effect in the early 1950's when for national interest and defense we were trying to keep a monopoly on enrichment because we didn't want this enrichment capability to go to these countries because in making enriched uranium for civilian power material they could also make weapon material. In keeping the control of the enrichment facility here by furnishing them at a very reasonable nondiscriminatory price, we were looking at the security factor of not having these enrichment plants all over the world making bomb material.

POSSIBLE SALE OF SOVIET SERVICES TO JAPANESE

As I say, this has been a very complicated matter. I am not criticizing it. I don't know how long it is going to be. I am not concerned. As a matter of fact, here is an article which says the Japanese are eyeing a Soviet offer for uranium. It was in the Washington Post, Friday, June 22.

[The article referred to follows:]

[Reprinted from the Washington Post, June 22, 1973]

TANAKA EYES SOVIET OFFER OF URANIUM

TOKYO, June 21—Prime Minister Kakuei Tanaka today expressed interest in negotiating a governmental agreement with the Soviet Union to secure for Japan its first non-American source of enriched uranium.

Tanaka told a meeting of the Japan National Press Club that Soviet-Japanese cooperation in nuclear energy would "naturally become a very important topic of discussion" with Kremlin leaders when he visits Moscow this fall.

Tanaka called a recent Russian offer to provide Japan with enriched uranium for use in nuclear reactors generating electricity a proposal which would "positively promote Japan-Soviet economic cooperation." It was the first governmental reaction to a report made by a semi-private mission of Japanese nuclear energy experts who returned from the Soviet Union last Saturday.

The mission, headed by Toshiwo Doko, chairman of Toshiba Corp., reported that the Russians offered to sell Japan enriched uranium if a governmental agreement on atomic energy between the two countries is worked out.

I am not at all concerned about that. Let them buy it from the Soviets. Let anybody else buy from the Soviets if they think they can depend on the supply, and they think they can get it cheap enough, because every ton they buy from them leaves us with that much more source in own country, which is going to be worth more money 10 years from today than it is now.

Representative HOSMER. May I make one correction, Mr. Chairman? They are talking about buying enrichment services, not uranium, from the Soviets. Those are two different things. Buying enrichment services from the Soviets will not save any U.S. domestic uranium ore. We have to make that distinction.

On the other hand, the Japanese buying Soviet separative work instead of U.S. separative work will make some difference in the U.S. foreign exchange. That is the critical factor in my mind that we have to give attention to because, as has been pointed out, we have had this monopoly essentially and there will be additional productive capacity that will have to be added. Does the U.S. interest lie in maintaining

essentially a monopoly? This business at this point is just a baby; it is going to grow up into a real big thing, and we ought probably to be looking at how big a share of it we want to have.

SALE OF U.S. WHEAT TO RUSSIA

Representative HOLIFIELD. I am looking at the great bargain we got when we sold wheat to Russia for what? For \$2 a bushel, or \$2.50 a bushel. Now our American bakers and our American people are paying a dollar more a bushel as a result of the shortage of wheat here in our own country. So we made a big deal when we sold this wheat to Russia. Now the American people are paying for it in the price of bread.

Representative HOSMER. That is why I say we should watch, investigate, and decide this thing carefully from the standpoint of the U.S. national interest. This is a specific type of thing; a nonmaterial thing; it is a service. It is not a substance, and it has to be dealt with from that conceptual standpoint.

EFFECT OF EURATOM CEILING INCREASE ON U.S. CAPACITY

Senator MONTOYA. If you will permit me I will ask two or three more questions and then members of the subcommittee can go ahead. You can interrupt me along the way if you want to.

Now, you stated that raising the ceiling does not represent any obligation of AEC to supply the increased enriching services. Doesn't this revised ceiling, however, require AEC to reserve such capacity or quantity to meet this ceiling even though firm supply contracts have not yet been signed?

Mr. FLAHERTY. No, sir. We do not view it that way. Our enrichment capacity would be available on just a contract basis. This does not represent a reservation of capacity. It is true that we believe, as we forecast the situation today, that sufficient capacity does exist to enter into contracts represented by this amount, but his action, itself, does not represent that commitment.

EURATOM OBLIGATIONS TO PURCHASE ENRICHED URANIUM FROM UNITED STATES

Senator MONTOYA. Does it necessarily follow that the Euratom nations have a contractual obligation and requirement to purchase their uranium from the United States?

Mr. FLAHERTY. No, sir. Even if this legislation were to pass authorizing this ceiling, it is not an obligation on the part of Euratom to purchase under that ceiling.

Senator MONTOYA. For all we know, they could go ahead and purchase from Russia?

Mr. FLAHERTY. That is correct, although it is certainly our belief, and certainly assurances that we have been given by the Euratom Supply Agency, that it would be their intention to make the purchase from us.

Senator MONTOYA. What protection do we have if Russia decides to undersell us?

Mr. FLAHERTY. In that case if Russia decided to undersell us and the Euratom nations decided they can view Russia as a long-term reliable supplier and wish to tie themselves to the Russian economy, there is nothing to keep them from doing that.

Senator MONTROYA. Where is the quid pro quo in that contractual commitment?

Mr. FLAHERTY. Senator Montoya, I though you were talking about the legislation. If you are talking about the actual contractual commitments that we are entering into under the arrangement, then these are firm commitments. They make a downpayment, they are required to make a purchase. I am very sorry, I misunderstood the question.

CONTRACTUAL PROTECTIONS FOR UNITED STATES

Senator MONTROYA. Are we fully protected during the term of the commitment that these nations will buy the enriched uranium from us and not permit the Russians to underbid us?

Mr. FLAHERTY. Yes, I feel we are adequately protected.

Senator MONTROYA. Let us go into that.

Representative HOLIFIELD. Let us explain that. When they sign the contract they put up the deposit on it?

Mr. FLAHERTY. That is right.

Representative HOLIFIELD. I agree with you on that basis. But we are not protected against their making a better deal, and I don't think we should be.

Mr. FLAHERTY. I think that is quite right.

Representative HOLIFIELD. I just wanted to draw the line. I agree with you that the legislative ceiling we have established is a permissive ceiling. It is not mandatory that we sell or mandatory that they buy, as I understand it.

Senator MONTROYA. I was not speaking of the legislative ceiling or the provision in the legislation. I was speaking of the contracts entered into pursuant to the legislation whereby we commit to supply to them services and they commit to buy from us. What is the duration of this commitment on their part to buy from us? That is what I was trying to develop.

Mr. FLAHERTY. Yes, I think we can respond to that. I will ask Mr. Hoyle to describe our actual contract arrangements.

TERMINATION PROVISIONS

Mr. HOYLE. The contractual arrangements are such that they can be terminated by either party under certain circumstances. However, if the customer terminates and gives less than enough notice so that the AEC can be made whole, there are termination charges which the other party must pay which essentially leaves us in the same position economically as if we had delivered the material.

DOWNPAYMENT PROVISIONS

Senator MONTROYA. You mentioned that you have required a downpayment whenever they place an order. Does that downpayment apply to the specific order or does it apply to the complete servicing of all contracts under the commitment?

Mr. HOYLE. The downpayment applies to the initial delivery under the contract. If the customer cancels his contract before he ever takes any material and he has never gotten a construction permit for his reactor, then he forfeits the downpayment. That would be very early in this 8-year period, and we would have only minimal incurred costs up to that time.

Representative HOLIFIELD. Give us an example of how this works, and I think it will be plain to us. They may buy a certain amount for a known need, a reactor. Some country in the Euratom group contracting for distribution under their own formula of distribution buys so much, let us say \$30 million worth of fuel for a reactor for 30 years, and they pay \$3 million down on it, is that right?

Mr. HOYLE. Yes, if the reactor size is about 1,000 megawatts.

Representative HOLIFIELD. Then as we deliver, whatever the price we have charged them they pay on delivery. Anytime they do not want to buy that \$30 million they have to pay a penalty for the termination of this contract by forfeiting the \$3 million. Is that in general the formula?

Mr. HOYLE. That is in general the formula for early termination. However, if they terminate later, after we are committed to incur contractual charges for power, for example, which would not be recovered, then we can make charges which would permit recovering costs for that power.

Representative HOLIFIELD. Is that plain on the record, Mr. Chairman.

Senator MONTOYA. I think so.

In other words, is your commitment or contractual obligation confined strictly on a reactor basis or is it for future requirements for future reactors also?

Mr. FLAHERTY. It is only on a firm contract for a specific reactor.

Representative HOLIFIELD. Again to keep the record straight, that is not firm; to the extent they are willing to forfeit their deposit, they can get out of that. We cannot force them if they are willing to give up their deposit.

Mr. FLAHERTY. But there will be no loss to the U.S. Government.

Representative HOLIFIELD. That is right.

TERM FOR ENRICHING INCREASED QUANTITIES

Senator MONTOYA. Over what period of time will the additional 368,000 kilograms of enriched uranium be delivered?

Mr. HOYLE. That would be for the balance of the agreement for cooperation, in other words, through the end of 1995.

ADEQUACY OF U.S. CAPACITY

Senator MONTOYA. Does the AEC have enough capacity within its present capability to meet the increased quantities contained in the proposed legislation?

Mr. QUINN. Yes, it does, Mr. Chairman.

Representative HOLIFIELD. Provided the CIP-CUP is brought into existence.

Mr. QUINN. Yes. With the CIP-CUP our commitments under contracts are somewhere between 40 and 50 percent of our capability to

deliver at the present time. So, we have substantial additional contracting room for additional commitments.

Senator MONTÓYA. You will take into consideration over that period of time the increased domestic need which is not under contract with you or will the domestic buyers have to come in and make firm contracts and prepayments?

Mr. QUINN. The domestic customers will be subject to the same types of contracts as the foreign customers. In other words, they are all governed by our criteria. Let me just quote a few numbers. Between now and the end of fiscal year 1983, which is the time when we expect to require a new plant, existing contracts and existing agreements for cooperation, the old agreements that do involve supply commitments, are projected to consume just about 50 percent of the total production availability.

Representative HOLIFIELD. Are you going to hold that ceiling or are you going to allow it to go to 75 or 80 for foreign purchases to the detriment of the domestic supply in the future?

Mr. QUINN. That 50 percent, once the contracts for all of the domestic reactors that we anticipate will need delivery during this period, will increase to about 75 percent.

Representative HOLIFIELD. For whom? For the domestic reactor or the foreign reactor?

Mr. QUINN. Existing commitments, plus anticipated additional domestic commitments. So, that will leave us about 25 percent available to accommodate additional foreign customers.

PERCENT OF CAPACITY ALLOCATED TO DOMESTIC AND FOREIGN MARKETS

Representative HOLIFIELD. What will the total be of our complete capacity that will be allocated by that time to the domestic and to the foreign market?

Mr. QUINN. It will be slightly more than 50-50 in favor of the domestic. It will be maybe 60-40 in the domestic favor.

Representative HOLIFIELD. I am glad to get that figure on the record so that we know we have some protection for the future for the domestic buyer.

Mr. QUINN. Each time we enter into a contract, of course, we will assure ourselves that we have the capability to meet the commitments under that contract.

IMPACT OF ANOTHER U.S. ENRICHMENT PLANT

Representative HOLIFIELD. Of course if in this period of the decade as we look ahead, the centrifuge becomes economically competitive and another plant is put up, then it is a new ball game.

Mr. QUINN. We would expect that our contracts which are to be supplied from the existing plants would remain in force.

Representative HOLIFIELD. That is right. But as far as additional capacity beyond our existing plants and the CIP-CUP improvements, that would be a different matter of consideration and this committee of course would be informed on the basis of the merits of that particular increment of enriched material.

Mr. QUINN. And the increment could be the diffusion or centrifuge.
 Representative HOLIFIELD. That is right.
 Senator MONTOYA. Do any of the committee members wish to ask further questions?

METHOD OF EXPRESSING QUANTITIES IN AGREEMENT FOR COOPERATION
 WITH THE JAPANESE

Chairman PRICE. Mr. Flaherty, is the recent Japanese Agreement for Cooperation on the basis of your new formula on kilograms or installed capacity?

Mr. FLAHERTY. This was on the basis of the installed capacity, the new formula.

Chairman PRICE. I don't recall the installed capacity.

Mr. FLAHERTY. 60,000 megawatts.

SALES NOT TO EXCEED ENRICHMENT CAPACITY

Chairman PRICE. Just to make clear the point that Mr. Holifield was getting at, there will be no material sold under the ceiling if the enrichment capacity is not available to meet the need.

Mr. FLAHERTY. That is correct.

Chairman PRICE. That is a definite position?

Mr. FLAHERTY. That is a definite position that has been expressed to this committee previously.

NONDISCRIMINATORY TREATMENT OF CUSTOMERS

Chairman PRICE. It is also a definite position that our domestic needs take precedence?

Mr. FLAHERTY. We are at the moment treating our customers on a nondiscriminatory basis.

Chairman PRICE. That is for the price.

Mr. FLAHERTY. As far as price is concerned, but also what we have done, we have provided in our estimates an estimate of domestic requirements, and an estimate of our foreign possible sales, as Mr. Quinn has expressed.

Chairman PRICE. You certainly took that into consideration on the basis of being absolutely certain in your own mind that our needs would be met.

Mr. FLAHERTY. We certainly must be sure that our own needs are met. But we are prepared on the basis of our estimates to enter into contracts up to the quantity we mentioned and that would be about a 60-40 split between domestic and foreign customers, as Mr. Quinn has indicated.

MEGAWATT CAPACITY, DOMESTIC AND FOREIGN, SUPPLIED BY UNITED
 STATES

Chairman PRICE. What is the installed capacity for which we are now supplying enriched material for our overseas customers?

Mr. HOYLE. I would like to check that for the record.

Representative HOSMER. And do it for our own domestic customers, too.

[Material later supplied follows:]

As of June 1, 1973, the AEC had executed enriching services contracts to supply enriched uranium covering 26,000 megawatts of nuclear power in foreign reactors and 81,000 megawatts in domestic reactors or, a total of 107,000 megawatts of nuclear power. The AEC estimates that by June, 1974, enrichment services contracts covering 162,000 megawatts of nuclear power abroad and 204,000 megawatts, domestically will be in effect, or a total of 366,000 megawatts.

Senator MONTROYA. Congressman Holifield.

Representative HOLIFIELD. No questions.

Senator MONTROYA. Congressman Hosmer.

BACKGROUND OF CEILING APPROACH: SECTION 54 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED

Representative HOSMER. Can you explain the historical background for why this ceiling price approach was adopted to sell enrichment services?

Mr. FLAHERTY. The ceiling price?

Representative HOSMER. Excuse me. Ceiling approach.

Mr. FLAHERTY. You mean why we are using magawatts instead of the—

Representative HOSMER. No. I want you to go all the way back to the beginning and say why was this cumbersome setup inaugurated in the first place. What were the reasons? I am trying to find out whether they are anachronistic or still viable reasons.

Mr. FLAHERTY. I am going to call on someone who has been here longer than I have to respond to that. I ask Mr. Hoyle to do that, Mr. Hosmer.

Mr. HOYLE. As you are aware, there are two types of ceilings—those of our bilateral agreements, which of course simply are stated as a part of the agreement and, thus, are subject to the normal 30-day waiting period before the committee, and those which apply to our agreements with groups of nations, which are subject to section 54, where specific legislation is required.

With respect to the first type—the bilateral agreement—the ceilings on these, I understand, were included at the express request of this committee.

Representative HOSMER. Think back now and tell us what the considerations were at that time that got us into this involved type of arrangement.

Mr. HOYLE. I think, with regard to the bilaterals, it was the desire to be assured that we had adequate enrichment capacity to meet the commitments we were making, because the agreements at that time represented a commitment to supply. Now with regard to the position toward groups of nations under section 54, it is my understanding that this legislative requirement came during the time prior to the formation of the International Atomic Energy Agency when the precise mechanism of transferring material to the Agency was not fully determined and there was concern on the part of this committee that our method of transfer might result in a “giveaway” program. Therefore, there was a desire that any such transfers be monitored by the Congress.

I might add that at the time there was no European Atomic Energy Community in being, and use of the language “group of nations” swept in the Community as well as the IAEA.

U.S. ENRICHMENT CAPACITY : CEILING ON CONTRACTING TO BE REACHED IN
1974

Representative HOSMER. Today in relation to our capacity to enrich we are approaching a topped-off state insofar as these orders are concerned because I think it has been estimated that by October or so of next year all the capacity will have been contracted for. Is that correct.

Mr. FLAHERTY. That is correct.

Representative HOSMER. Then if we add a new capacity we are going to have to deal in some way with probably the control of sales if that is prudent or abandon the idea at that time; is that correct?

Mr. HOYLE. That is correct.

STATUS OF CONTRACTING UNDER REVISED ENRICHMENT CRITERIA

Representative HOSMER. Have you made any new contracts under the new criteria as yet?

Mr. HOYLE. No. As I understand it, the moratorium remains in force until we have completed our review of the comments being received from both foreign and domestic industry on our fixed commitment-type draft contracts and come out with a standard model contract.

Representative HOSMER. I hear a rumor that it is likely that people, even with the firm contracts being at a cheaper price, may use the requirements contract in any event.

Mr. HOYLE. The current indications are that there will not be many conversions from the requirements-type contract to fixed commitment type contract, despite the \$2.50 differential.

Representative HOSMER. That is all, Mr. Chairman.

Thank you.

Senator MONTAYA. Congressman Hansen?

Representative HANSEN. Thank you.

I think the fact that we have a quorum call in the House in progress is going to limit essentially my questions, but perhaps I can raise my concerns and you can comment briefly and then elaborate in any answers for the record that may be appropriate.

ADEQUACY OF URANIUM ORE SUPPLIES

My concern goes, as it has frequently, to this matter of the adequacy of the supplies of uranium ore and the timetable that may be required to develop the deposits that may exist, to mine and mill and produce the U_3O_8 that is required. On the basis of your press release recently from the AEC it was estimated, as I recall, that about 2.4 million tons of U_3O_8 will be required to meet the needs for the power industry between now and the end of this century. Do I understand we have about 60,000 tons on hand in the inventory at the present time in the stockpile?

Mr. QUINN. That is the AEC inventory. Now we have reserves in the ground of 273,000 tons producible within an \$8 price.

Representative HANSEN. Against the total requirement by the end of the century, my rough calculation suggests that the AEC inventory will represent about 3 percent and the known reserves about 10 percent of that total.

Mr. QUINN. Roughly.

LEADTIMES REQUIRED FOR DEVELOPING NEW MINES AND MILLS

Representative HANSEN. Now the first question is for the exploration to locate additional reserves, to develop a mine and to perform the milling operation that will produce the U_3O_8 , what kind of time period can we anticipate that would require.

Mr. QUINN. On the basis of experience, Mr. Hansen, there are quite long lead times to the development of additional sources of uranium. These are equivalent to the lead times in supplying additional enrichment capacity. Something on the order of 8 years to go out and do the exploration, the development drilling, to identify the reserves, plan the appropriate method of mining, opening up the mine, building a mill and getting it into production. I think an 8 year lead time is perhaps a minimum there.

ECONOMIC INCENTIVES TO STIMULATE EXPLORATION

Representative HANSEN. Let me ask if you are satisfied that the economic incentives now exist to stimulate the exploration on the scale that is required and to encourage the investment of the capital that will be required to produce the amount of U_3O_8 that will be needed according to the AEC projections?

Mr. QUINN. I think the primary economic incentive is the willingness of the utilities to enter into contracts to purchase uranium. Now we are hopeful that one byproduct of our new type of enriching contract, which will commit the customer to an 8-year leadtime for the first delivery and 10 years of firm commitments beyond that, will encourage him accordingly to enter into long-term commitments for uranium to match that commitment for separative work. At the present time, while there is some firming of the price which indicates greater activity in the negotiations, it is clear that there is not sufficient incentive for industry to do the amount of exploration that we believe is needed. In 1969 the industry, on the basis of projections then available, drilled something like 30 million feet. In the last couple of years it has been down to about 50 percent of that. Obviously that rate has to turn up and it has to turn up in the very near future if the resources are to be developed to meet the demands that we can foresee in the 1980's.

DECLINE IN RATE OF DISCOVERY IN 1972

Senator MONTOYA. I would like to ask one question.

The report by the Joint Committee on Atomic Energy authorizing the appropriations on page 7 noted the decline in the rate of discovery. I will read from that report: "The rate of discovery measured in terms of recoverable material declined in 1972 to a little more than one-half of the previous 5-year average. As a result, for the first time since 1967 there was no net increase in uranium reserves because new discoveries only offset production during the year.

Possible future problems with this weakening resource position were highlighted when the Commission issued its forecast of long-term uranium requirements, (WASH-1139, 1972) which concludes that there will be even larger requirement for source material by the end of the century than had been anticipated. The report predicted

as a most likely case an annual requirement of 120,000 tons of U_3O_8 in 1990 and 154,000 tons in the year 2,000. The latter figure is 12 times the current production rate and eight times the peak production level reached in the military procurement program in the 1950's."

So we are in a declining basis right now. What does the AEC anticipate by way of trying to develop more exploration, other than merely the idea of trying to provide more incentives?

Mr. QUINN. Mr. Chairman, as I mentioned earlier, the only commercial incentive at the moment is the market that can be foreseen. What the Commission has been attempting to do within the last several months is to publish a number of reports to highlight this situation, to get the message across both to the producers and to the consumers that it is in their mutual interest to begin talking seriously about long-term contracts for uranium. It is a tremendous job. For example, the 120,000 ton per year you quoted for 1990 represents almost as much as the entire quantity of uranium that has been found in the Ambrosia Lake District.

So this is going to mean finding the equivalent of an Ambrosia Lake and producing it every year in the 1990's. This is a tremendous challenge.

EIGHT-YEAR LEADTIME REQUIREMENTS

Senator MONTROYA. Now you mentioned the 8-year leadtime. That is with respect to discovery, exploration, core drilling, and then setting up the mill? Is that what you mean by the 8-year leadtime?

Mr. QUINN. Yes. That would be the time from the beginning of the exploration work until the mill gets into production. Now I think that time is certainly subject to the success of the exploration effort in finding uranium.

Senator MONTROYA. What if you have some mills already located in the area, then the leadtime is only up to the point of discovery, is it not, and then mining?

Mr. QUINN. You see, one would construct a mill concurrently with the opening up of a mine so that the availability of a mill probably would not save any time.

Senator MONTROYA. So, you still cling to the 8-year lead?

Mr. QUINN. I think that would be a minimum.

Senator MONTROYA. Thank you, Mr. Quinn. That concludes my questions. As I stated in my opening statement, because of the brief notice of these hearings the record will be held open for an additional 10 days. If the subcommittee needs additional information on any matter the Chair will call additional hearings or require that the information be submitted in writing. [See app. 4.]

Unless there is any other statement to be made, we will stand in adjournment subject to the call of the Chair.

Mr. FLAHERTY. Thank you very much, Mr. Chairman.

[Whereupon, at 3:45 p.m. the hearing was adjourned, subject to the call of the Chair.]

[Appendixes follow:]

APPENDIX 1

[The following letter was also sent to Speaker Carl Albert, House of Representatives, on the same date:]

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., March 27, 1973.

CONGRESS OF THE UNITED STATES,
HON. SPIRO T. AGNEW,
President of the Senate

DEAR MR. PRESIDENT: There is transmitted herewith a Commission proposal in the form of a draft bill "To amend the EURATOM Cooperation Act of 1958, as amended." The proposed legislation is enclosed as Appendix "A"; an analysis of the legislation is enclosed as Appendix "B"; and a comparative draft bill is enclosed as Appendix "C".

Specifically, the proposed legislation would amend the EURATOM Cooperation Act of 1958, as amended, to increase the quantity of contained uranium 235 which may be transferred to the European Atomic Energy Community from 215,000 kilograms, to an amount of contained uranium 235 which does not exceed that necessary to support the fuel cycle of power reactors located within the Community having an installed capacity of 35,000 megawatts of electric energy, together with 25,000 kilograms of contained uranium 235 for other purposes.

The proposed legislation could result in substantial increases in revenues to the United States. It is anticipated that the additional amounts of uranium 235 will be transferred to Euratom under uranium enrichment services contracts. Assuming that the entire additional quantity is transferred under such contracts, the revenues to the United States would be about \$1.8 billion.

Enactment of the proposed legislation is not anticipated to result in additional man-years of employment during the first five years following its passage, and there would be no predictable budgetary impact.

The Commission has determined, pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969, guidelines of the Council on Environmental Quality, and the Commission's regulations implementing Section 102(2)(C), that this legislative proposal does not require preparation of an environmental impact statement.

The Office of Management and Budget has advised that there is no objection from the standpoint of the Administration's program to the submission of the proposed legislation for consideration by the Congress.

Sincerely,

DIXY LEE RAY, *Chairman.*

Enclosures: Appendix "A", "B", "C".

APPENDIX "A"

DRAFT BILL

To amend the EURATOM Cooperation Act of 1958, as amended.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 5, of the EURATOM Cooperation Act of 1958, as amended, is amended by deleting the words "two hundred fifteen thousand kilograms of contained uranium 235" and substituting therefor the words "an amount of contained uranium 235 which does not exceed that necessary to support the fuel cycle of power reactors located within the Community having a total installed capacity of 35,000 megawatts of electric energy, together with 25,000 kilograms of contained uranium 235 for other purposes."

APPENDIX "B"

ANALYSIS OF DRAFT BILL TO AMEND THE EURATOM COOPERATION ACT OF 1958, AS AMENDED

Section 5 of the EURATOM Cooperation Act of 1958, as amended, presently authorizes the Commission to transfer 215,000 kilograms of contained uranium 235 to the European Atomic Energy Community under the Agreements for Cooperation between the United States and Euratom. The proposed amendment to Section 5 would increase this amount of contained uranium 235 by authorizing the Commission to transfer to the Community an amount of contained uranium 235 which does not exceed that necessary to support the fuel cycle of power reactors located within the Community having a total installed capacity of 35,000 megawatts of electric energy, together with 25,000 kilograms of contained uranium 235 for other purposes.

The reasons for changing the method of expressing the amount of enriched uranium authorized for transfer for use in fueling power reactors from a quantitative contained uranium 235 basis to an unspecified quantity of contained uranium 235 required to fuel a specified number of megawatts of electric energy will be explained later in this analysis.

Section 54 of the Atomic Energy Act of 1954, as amended, requires specific authorization by the Congress of the amount of special nuclear material which may be distributed by the Commission to a group of nations.

The initial authorization for transfer by the Commission of enriched uranium to the Community occurred in 1958, in conjunction with the U.S.-Euratom Joint Program Agreement, and was for 30,000 kilograms of contained uranium 235. Following entry into force of the U.S.-Euratom Additional Agreement for Cooperation in 1960, the uranium ceiling of the EURATOM Cooperation Act was increased to 70,000 kilograms in 1964 and again, most recently, to its present level of 215,000 kilograms in 1967.

Of the present 215,000 kilogram uranium 235 ceiling, the Community currently has contracted for about 187,000 kilograms, primarily under long-term toll enrichment services contracts for power reactors. The balance of approximately 28,000 kilograms will be placed under contract in the near future, principally to satisfy research requirements and to extend several existing power reactor toll enrichment contracts which currently run for relatively short periods. The portion of the presently-authorized 215,000 kilograms to be utilized in the fuel cycle of power reactors in the Community has permitted fueling of an installed capacity of about 20,000 megawatts (electric).

Included within this 20,000 megawatts, however, are a number of Community reactors whose toll enrichment contracts must be extended in order to cover the provision of fuel over the life of the Additional Agreement for Cooperation, which extends through 1995. That portion of the balance of 28,000 kilograms remaining under the present authorization will be insufficient to fully supply such reactors over the life of the Additional Agreement. Continued fueling of all of these reactors will require the provision of about 140,000 additional kilograms of contained uranium 235, or about 22 million units of separative work (SWU) at a tails assay of 0.275% uranium 235, through 1995.

During the period from July 1, 1972 through December 31, 1976, it is estimated that construction of some 15,000 additional megawatts (electric) of light-water reactor capacity will be started in the Community, excluding France. (The French already have placed under a firm quantities toll enrichment contracts with AEC all of their anticipated enriched uranium fuel requirements through the early 1980's; thereafter, they plan to obtain continuing requirements from enrichment facilities in which there is direct French participation.) The AEC has reviewed the data supplied by Euratom in support of this estimate and believes that the 15,000 megawatt figure is conservatively stated; comparable AEC data would indicate a total of at least 18,000 megawatts started under construction during this same period. Stated in terms of separative work required over the life of the Additional Agreement, the approximate figure corresponding to this additional 15,000 megawatts (electric) is 32 million separative work units (at a tails assay of 0.275% uranium 235) or, in terms of uranium 235, about 230,000 kilograms.

In expressing the amounts of enriched uranium which must now be authorized by the Congress for distribution to Euratom by the Commission pursuant to Section 54 of the Atomic Energy Act of 1954, as amended, a new method has

been used in the draft bill. This new method of expression is desirable in light of recent changes in the enriched uranium supply policies of the Commission.

Under the policy employed by the Commission to date, each international agreement for cooperation providing for the transfer of enriched uranium has contained a "ceiling quantity" expressed in terms of kilograms of contained uranium 235. At the time of entering into such agreements for cooperation, that portion of AEC's enrichment capacity required to produce the quantity of enriched uranium specified in the ceiling of the agreement for cooperation has been internally allocated to the cooperating nation or group of nations. At such later time as each power reactor contemplated under the agreement comes into being, a toll enrichment services contract is executed providing for the long-term supply of enriched uranium for the project. Thus under our policy to date production capacity has been allocated prior to actual execution of the supply contract.

With the increased confidence of overseas users in the AEC's willingness and ability to supply enrichment services as needed, the Commission has determined that it is no longer necessary or desirable that the ceiling quantity stated in agreements for cooperation constitute an advance allocation of Commission production capacity. Accordingly, it is now anticipated that future agreements for cooperation will no longer constitute such an advance allocation of capacity. The allocation of capacity, as well as the supply commitment, will be made at the time of execution of individual supply contracts, which will occur at some time following a firm undertaking by the customer to proceed with the reactor project.

Under this revised policy, a change in the method of calculating and expressing the ceiling limitation in agreements for cooperation has become desirable. In the case of Euratom, this change also involves a revision in the method of calculating and expressing the amounts authorized for transfer to the European Atomic Energy Community pursuant to the EURATOM Cooperation Act.

First, the Commission plans to return to its former practice of calculating the ceiling amounts on the basis of five years' advance needs, rather than the present three years' advance calculation. Five years is a more reasonable planning period and provides adequate time in which to accommodate necessary revisions in an initial plan. In the case of nations having substantial nuclear power programs, such revisions are almost certain to be required. Since the ceiling quantity in the agreement for cooperation no longer constitutes an advance allocation of production capacity, this revision will not result in an increased encumbrance upon production capacity.

Second, as indicated earlier, the ceiling will be expressed in terms of the amount of uranium 235 required to support the fuel cycle of a specified number of total megawatts of electric energy. Although this basis does not permit establishing a completely definitive uranium 235 ceiling, this fact is not considered a major disadvantage since under the new approach the ceiling does not constitute a supply undertaking; rather, the maximum amount of separative work which the U.S. is committed to supply will only be established in the supply contracts executed under the agreement. However, by use of appropriate conversion factors, the maximum amount of separative work (or equivalent uranium 235) which could be transferred under the agreement may be computed quite closely for planning purposes.

There are a number of advantages in shifting to the megawatt ceiling basis. Among these are:

1. Installed power capacity is, in any event, the basic assumption from which either separative work or uranium 235 requirements must be derived;
2. A megawatt ceiling is simpler and more readily understood;
3. Since domestic enrichment requirements normally are expressed in terms of the number of megawatts of installed capacity by a given date, expressing the foreign ceiling in comparable terms will facilitate comparison between foreign and domestic requirements;
4. A megawatt ceiling will avoid the necessity of having to make relatively minor adjustments resulting from such factors as a change in the type of power reactor planned at the time the agreement is negotiated and from technical revisions in the assumed fuel cycle; and
5. A megawatt ceiling will make unnecessary some detailed AEC internal record keeping, without comprising in any way the data needed for safeguards purposes.

It is not feasible to express requirements for enriched uranium for use other than in the fuel cycle of Community power reactors in terms of megawatts.

Therefore, as a result of the requirements of Section 54 of the Atomic Energy Act, it is necessary that a contained uranium 235 ceiling be retained in the EURATOM Cooperation Act for such other purposes. Thus, a total of 25,000 kilograms of contained uranium 235 also is provided in the proposed amendment for such other purposes, including the fueling of research and test reactors, third country fabrication and chemical processing, and for such other applications as are included within the scope of the Additional Agreement for Cooperation. Based on an AEC analysis of past experience and anticipated types and magnitudes of such applications, it has been determined that the 25,000 kilogram estimate is a reasonable one.

Combining these new enrichment requirements of the Community with those provided for previously under the EURATOM Cooperation Act, as amended, and converting to the new megawatt ceiling basis, the total quantity of contained uranium 235 becomes that required in the fuel cycle of power reactors having an installed capacity of 35,000 megawatts (electric) plus a total of 25,000 kilograms of uranium 235 for other purposes. The corresponding estimates of enriched uranium and separative work required are 610,000 kilograms of contained uranium 235 and 90 million SWU, at the contemplated operating tails assay of 0.275% uranium 235.

At the present separative work charge of \$32 per SWU, revenues to the U.S. through 1995, if the entire 90 million SWU ultimately were to be sold in the Community under toll enrichment services contracts, would be in the order of \$2.9 billion. At present, enrichment services contracts already concluded with Community organizations have an estimated value of about \$724 million; in addition, there are significant continuing revenues under straight sale, deferred payment sale, and lease contracts. There would probably be additional revenue to U.S. industry from these transactions as a result of sales of supportive materials and services and from the sale of reactor equipment.

If the projected uranium 235 requirements should prove excessive to Euratom's actual needs, the U.S. will not be obligated to deliver such excess amounts. This results from our new policy of not entering into a firm supply commitment until a supply contract is executed.

Deliveries of the additional uranium 235 authorized by this amendment are not expected to take place for several years. Hence, when delivered, such uranium 235 will presumably be subject to the safeguards provided for in the agreement recently negotiated between the International Atomic Energy Agency, Euratom, and certain member states of the latter, to meet the requirements of the Non-Proliferation Treaty. In this connection, an amendment to the US-Euratom Additional Agreement for Cooperation, which has been submitted to the Joint Committee on Atomic Energy pursuant to Section 123(c) of the Atomic Energy Act, provides that the undertakings thereunder are subject not only to enactment of the legislation here involved, but also to the provisions of applicable laws, treaties, regulations and license requirements in effect in the United States, in the Community and within the Member States. Thus, all transfers of special nuclear material by the U.S. to the five non-nuclear-weapons States of Euratom pursuant to the authority of the proposed amendment to the EURATOM Cooperation Act will be subject to our Treaty obligations of which NPT safeguards are a part.

This distribution of material in the quantity provided for in this amendment has been taken into account in Executive Branch planning.

APPENDIX "C"

COMPARATIVE DRAFT BILL

To amend the EURATOM Cooperation Act of 1958, as amended.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 5, of the EURATOM Cooperation Act of 1958, as amended, is amended to read as follows:

"Sec. 5. Pursuant to the provisions of Section 54 of the Atomic Energy Act of 1954, as amended, there is hereby authorized for sale or lease to the Community—

"an amount of contained uranium 235 which does not exceed that necessary to support the fuel cycle of power reactors located within the Community having an installed capacity of 35,000 megawatts of electric energy, together with 25,000 kilograms of contained uranium 235 for other purposes;

["two-hundred-fifteen-thousand kilograms of contained uranium 235;]

"one thousand five hundred kilograms of plutonium; and

"thirty kilograms of uranium 233;

in accordance with the provisions of an agreement or agreements for cooperation between the Government of the United States and the Community entered into pursuant to the provisions of section 123 of the Atomic Energy Act of 1954, as amended: *Provided*, That the Government of the United States obtains the equivalent of a first lien on any such material sold to the Community for which payment is not made in full at the time of transfer. The Commission may enter into contracts to provide, after December 31, 1968, for the producing of enriching of all, or part of, the above-mentioned contained uranium 235 pursuant to the provisions of subsection 161v.(B) of said Act, as amended, in lieu of sale or lease thereof."

APPENDIX 2

93^d CONGRESS
1st SESSION**S. 1993**

IN THE SENATE OF THE UNITED STATES

JUNE 13, 1973

Mr. PASTORE (by request) introduced the following bill; which was read twice
and referred to the Joint Committee on Atomic Energy

A BILL

To amend the EURATOM Cooperation Act of 1958, as amended.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That section 5 of the EURATOM Cooperation Act of 1958,
4 as amended, is amended by deleting the words "two hundred
5 fifteen thousand kilograms of contained uranium 235" and
6 substituting therefor the words "an amount of contained
7 uranium 235 which does not exceed that necessary to support
8 the fuel cycle of power reactors located within the commu-
9 nity having a total installed capacity of thirty-five thousand
10 megawatts of electric energy, together with twenty-five
11 thousand kilograms of contained uranium 235 for other
12 purposes".

APPENDIX 3

93^D CONGRESS
1ST SESSION**H. R. 8867**

IN THE HOUSE OF REPRESENTATIVES

JUNE 20, 1973

Mr. PRICE of Illinois (by request) introduced the following bill; which was referred to the Joint Committee on Atomic Energy

A BILL

To amend the EURATOM Cooperation Act of 1958, as amended

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That section 5 of the EURATOM Cooperation Act of 1958,
4 as amended, is amended by deleting the words "two hundred
5 fifteen thousand kilograms of contained uranium 235" and
6 substituting therefor the words "an amount of contained
7 uranium 235 which does not exceed that necessary to support
8 the fuel cycle of power reactors located within the community
9 having a total installed capacity of thirty-five thousand mega-
10 watts of electric energy, together with twenty-five thousand
11 kilograms of contained uranium 235 for other purposes".

I

APPENDIX 4

MEMORANDUM BY THE DELEGATION OF THE EUROPEAN COMMUNITIES FOR THE RECORD OF THE HEARINGS HELD ON JUNE 22, 1973, BY THE JOINT COMMITTEE ON ATOMIC ENERGY, SUBCOMMITTEE ON AGREEMENTS FOR COOPERATION, ON PROPOSED AMENDMENT TO THE EURATOM COOPERATION ACT OF 1958, AS AMENDED.

Special nuclear material made available to the European Communities is supplied under the Agreement for Cooperation between the U.S. Government and the European Atomic Energy Community, up to amounts provided for in the authorized ceiling (Section 5 of the Euratom Cooperation Act of 1958, as amended).

This Agreement for Cooperation, signed in 1958, was the first step towards a close, mutually (commercially and technically) beneficial cooperation in the peaceful application of atomic energy. This cooperation was mainly based on a joint power program using U.S. (light water) technology and aiming at the development of power plants within the six countries of the European Communities, totalling about 1,000 M.W.e.

The power program was supported by an intensive joint R&D effort on a matched fund basis in which Euratom and AEC spent about 27 million dollars each.

The conclusion of an Agreement for Cooperation between the U.S. Government and Euratom was a pre-requisite to terminate the existing bilateral agreements between the U.S. Government and Community member states, upon their expiration (except for the U.S.-Italian agreement, which has not expired yet). As a consequence, special nuclear material requirements of the Community member states signatory to the original U.S.-Euratom Agreement for Cooperation, are implemented through this agreement, as amended.

For the conclusion of supply contracts and the implementation of fuel transactions, the Euratom Supply Agency, by virtue of the Euratom Treaty, chapter six, has been and is exercising the exclusive right to conclude supply contracts for all users of special nuclear materials within the territory of the European Communities.

The first ceiling, which was a firm AEC commitment to supply enriched uranium for this initial program, was established in 1958. In accordance with U.S. statutory requirements, this ceiling authorization was identified in the Euratom Cooperation Act of 1958 (an annexe to the Atomic Energy Act of 1944, as amended), providing for the transfer of 30 tons of U-235 plus one Kg. of Pu for both joint power and R&D programs set up by the Agreement for Cooperation.

In view of the growing nuclear power demand in the European Communities, outside the joint power program, and in order to fuel the other power plants by utilizing the unused parts of the authorized 30 tons ceiling, in 1960, an additional Agreement for Cooperation between the U.S. Government and Euratom was negotiated and went into effect on July 25, 1960.

Due to the expansion of the European nuclear power generation programs, a first ceiling increase came into force in August 1961, with the effect of raising the available quantity of U-235 from 30 to 70 tons, to be used for both power generation and R&D purposes. Besides, the same statutory authorization provided for the transfer to the European Communities of 500 Kg. of Pu, and of 30 kg. of U-233 for R&D purposes.

In April 1968, the ceiling was further raised from 70 to 215 tons of U-235 and from 500 to 1,500 Kg. of Pu, while the availability of 30 Kg. of U-233 for R&D purposes was maintained.

Each of these requests was introduced by the AEC for legislation in accordance with Sections 54 of the Atomic Energy Act, on the basis of detailed fuel requirements forecasts provided by the European Communities' Commission.

Unfortunately, and because of the complex legislative procedural aspect involved, in each case, preparation and passage of pertaining legislation took up to a year and more, thus leaving the European Commission and utilities in suspense as regards their programs and investment planning.

A brief comment on the balance-of-payment and trade aspects involved in the purchases of special materials to date may be of interest. During the span of the past 13 years, Community users have spent approximately 200 million dollars for transactions involving both special nuclear and raw materials (natural uranium) either for power or research purposes. If the present legislation is passed, the total revenue value to the United States, under the new 35,000 M.W.e. ceiling, is estimated to amount to 2.9 billion dollars. This is a conservative estimate based upon the present 32 dollars price.

A basic difference of the pending 35,000 M.W.e. ceiling, as compared with the previous ones, should be emphasized. According to the latest amendment to the additional Agreement for Cooperation between the U.S. Government and Euratom (signed in September 1972), the ceiling provision no longer represents a firm AEC commitment to supply nuclear material to the European Communities. As per Article I of the amended additional Agreement, any supply of enriched uranium by the AEC is subject to the

availability of the capacity in the AEC's enrichment facilities. This means a "first-come, first-served" approach on the part of the A.E.C. Therefore, it becomes even more urgent to obtain an overall ceiling authorization, in order to have at least equal chances as other foreign consumers to enter into binding contract negotiations on behalf of utilities in the European Communities.

As an introduction to the explanation of the requested 35,000 MWe ceiling, attention is invited to the extreme urgency of the approval of this request.

On the basis of its previous experience in obtaining two ceiling increases, the Supply Agency, on behalf of the European Communities Commission, introduced the formal request for the pending 35,000 MWe ceiling in early March 1972, in parallel with the negotiation of the latest amendment to the additional Agreement for Cooperation. It was mutually assumed, at that time, that the 35,000 MWe ceiling authorization would have been passed by the end of 1972.

Consequently, the Euratom Supply Agency started with the U.S. Mission to the European Communities in Brussels negotiations on behalf of five nuclear power plants under construction, which had requested long-term requirements contracts. It was assumed that these contracts would be signed as soon as the ceiling authorization would have been granted. The situation changed abruptly on December 8, 1972, when the AEC, in view of its new Supply policy, decided not to sign any Supply contracts on the basis of the requirements type.

Today, the situation has become even more complicated due to the fact that according to the new established enrichment criteria, the AEC requests signature of long-term fixed commitment supply contracts by December 31, 1973 for their customers which have ordered their reactor before May 9, 1973.

This increases with regard to the Community the number of reactors entering into this part of the transitional period from five to seven.

Therefore, if no immediate solution regarding the pending ceiling increase should be found well before December 31, 1973, the European utilities and the Supply Agency will literally "hit the ceiling" and be unable to contract in time for the materials needed. As it stands, under the present 215 tons ceiling, there remains only about 20 tons to fill the immediate needs of seven power plants, totalling 8,000 MWe, to receive first product delivery between early 1974 and 1977. The total amount required to fuel these seven power reactors is about 85 tons of U-235. The amount left neither suffices to enter into supply contracts for these power plants nor does it provide any flexibility to fill as yet undecided bulk purchases of enrichment services.

The AEC has thoroughly examined the request for additional materials and considers it a conservative estimate of the Community needs for the period of July 1972 - March 1977.

Furthermore, attention is invited to the fact that the introduction of new criteria for enrichment services requires a lead time for contract conclusion of eight years. Needless to say that this decision has further complicated the issue

as no ceiling request has yet been introduced for such needs.

In view of the situation described, prompt action by the Congress would be highly appreciated, and would also be in the mutual interest of both the U.S. producers and the European users.

APPENDIX 5

Calendar No. 324

93D CONGRESS }
1st Session }

SENATE }

REPORT
No. 93-341

AMENDING SECTION 5 OF THE EURATOM COOPERATION ACT OF 1958, AS AMENDED

JULY 24, 1973.—Ordered to be printed

Mr. PASTORE, from the Joint Committee on Atomic Energy,
submitted the following

REPORT

[To accompany S. 1993]

The Joint Committee on Atomic Energy, having considered S. 1993 to amend the EURATOM Cooperation Act of 1958, as amended, hereby reports favorably thereon and recommends that the bill do pass.

SUMMARY OF THE BILL

Section 5 of the EURATOM Cooperation Act of 1958, as amended, presently authorizes the U.S. Atomic Energy Commission to transfer 215,000 kilograms of contained uranium 235 to the European Atomic Energy Community under the Agreements for Cooperation between the United States and Euratom.¹ The proposed amendment to Section 5 would increase this amount from 215,000 kilograms of contained uranium 235 by 368,000 kilograms to a total of 583,000 kilograms. The new total of 583,000 kilograms is derived as follows:

1. The present ceiling of 215,000 kilograms is principally for the initial fueling of commercial power reactors having a total installed capacity of approximately 20,000 electrical megawatts.
2. The proposed increase of approximately 368,000 kilograms is intended to enable the Atomic Energy Commission to provide the European Community with uranium enriched in the isotope U-²³⁵ for use in the following three areas:²

(a) Approximately 140,000 kilograms of enriched material will be used to complete the fueling for the original 20,000 megawatts of electrical generating capacity over the remaining life time of the reactors.

¹ The European Community consists of France, West Germany, Italy, Belgium, The Netherlands, Luxemborg, United Kingdom, Ireland, and Denmark.

² Natural uranium contains only 0.7% of the isotope U²³⁵. The remainder is essentially U²³⁸ which is nonfissionable.

(b) Approximately 203,000 kilograms of enriched material will be used to fuel new reactors having a total installed capacity of 15,000 electrical megawatts over the entire life of the reactors.

(c) Twenty-five thousand kilograms of enriched material can be used for nonpower purposes, such as the fueling of research and test reactors and other research and development in the peaceful uses of atomic energy.

The 368,000 additional kilograms of contained uranium 235 constitutes approximately five percent of our estimated production during the remainder of the EURATOM agreement. (The EURATOM Cooperation Act is presently scheduled to expire in 1995.) It should be noted that, by law, the Atomic Energy Commission cannot enter into contracts for furnishing uranium enriching services in excess of its available capability.

The bill also incorporates a new method of expressing the ceiling which is intended to recognize the primary purpose for which the enriched material will be used. A detailed explanation of this new method of expressing the ceiling appears in a subsequent section of this report.

PURPOSE OF THE BILL

Section 54 of the Atomic Energy Act of 1954, as amended (42 U.S.C., Sec. 2074) requires specific authorization by the Congress of the amount of special nuclear material which may be distributed by the Commission to the International Atomic Energy Agency (IAEA) or any group of nations (Appendix 1). For the European Community, this authorization has been provided by the EURATOM Cooperation Act of 1958. The distribution of enriched uranium authorized by this legislation is effected under toll enrichment contracts between representatives of the Community and the Atomic Energy Commission (AEC). The increase in the ceiling provided by this amendment would enable the Community to purchase additional amounts of uranium enriching services under contracts with the AEC together with small amounts of uranium 235 for other purposes. The additional revenue to the Government from these transactions is estimated to be in excess of \$2 billion.

BACKGROUND

On March 27, 1973, the Atomic Energy Commission transmitted to the Congress a proposed bill to amend Section 5 of the EURATOM Cooperation Act of 1958. This bill was introduced, by request, on June 13, 1973, in the Senate by Vice Chairman Pastore as S. 1993 and on June 20, 1973, in the House by Chairman Price as H.R. 8867.

The Joint Committee's Subcommittee on International Agreements for Cooperation held a hearing on these bills on June 22, 1973. At that hearing the subcommittee received testimony from the AEC generally concerning the Community requirements for increased quantities of enriched material, the Commission's ability to furnish the additional amount of enrichment services required, and the reasons for changing the manner in which the ceiling was expressed from kilograms of contained uranium 235 to an amount which would be sufficient to support

the fuel cycle of power reactors of a total specified megawatt electric capacity. Additionally, the subcommittee accepted for the record a statement from the European Community which also emphasized the Community's urgent need for this material and the legislation.

The Joint Committee met in executive session on July 18, 1973, to consider these bills. At that time, the committee voted to report these bills favorably, without amendment, and adopted this committee report. These actions were taken by the unanimous vote of the members present.

COMMITTEE COMMENTS

In considering this legislation, the committee focused on three separate and distinct issues. These issues were: (a) the necessity of raising the present ceiling of 215,000 kilograms of contained uranium 235; (b) the AEC's ability to supply the additional quantity of enriching services; and (c) the reasons for changing the method of expressing the ceiling from kilograms of contained uranium 235 to a specified total of megawatts of installed generating capacity.

THE NEED FOR INCREASING THE PRESENT CEILING

The initial authorization for transfer by the Commission of enriched uranium to the Community occurred in 1958. That authorization was in conjunction with the U.S.-Euratom Joint Program Agreement, and was for 30,000 kilograms of contained uranium 235. Following the entry into force of the U.S.-Euratom Additional Agreement for Cooperation in 1960, the uranium ceiling of the EURATOM Cooperation Act was increased to 70,000 kilograms in 1964. The ceiling was increased to its present level of 215,000 kilograms in 1967 (P.L. 90-190).

At the present time, about 195,000 kilograms of the present 215,000 kilogram uranium 235 ceiling have been committed. These commitments are primarily in the form of long-term toll enrichment services contracts for power reactors in the Community. The AEC has advised that the balance of approximately 20,000 kilograms will be placed under contract in the near future. This amount will be used principally to satisfy research requirements and to extend several existing power reactor toll enrichment contracts which currently run for relatively short periods. The portion of the presently-authorized 215,000 kilograms to be utilized in the fuel cycle of power reactors in the Community has permitted fueling of an installed capacity of about 20,000 megawatts (electric).

Included within this 20,000 megawatts, however, are a number of Community reactors whose toll enrichment contracts must be extended in order to cover the provision of fuel over the life of the Additional Agreement for Cooperation, which extends through 1995. The committee understands that the portion of the balance of 20,000 kilograms remaining under the present authorization will not be sufficient to fully supply such reactors over the life of the Additional Agreement. Continued fueling of all of these reactors will require the provision of about 140,000 additional kilograms of contained uranium 235, or about 22 million units of separative work (SWU) at a tails assay of 0.275% uranium 235, through 1995.

During the period from July 1, 1972, through December 21, 1976, it is estimated that construction of some 15,000 additional megawatts (electric) of light-water reactor capacity will be started in the Community, excluding France. (The French already have placed firm quantities toll enrichment contracts with AEC for all of their anticipated enriched uranium fuel requirements through the early 1980's; thereafter, they plan to obtain continuing requirements from enrichment facilities in which there is direct French participation.) The AEC has reviewed the data supplied by Euratom in support of this estimate and believes that the 15,000 megawatt figure is conservatively stated. Comparable AEC data would indicate a total of at least 18,000 megawatts will be started under construction during this same period. Stated in terms of separative work required over the life of the Additional Agreement, the approximate figure corresponding to this additional 15,000 megawatts (electric) is 32 million separative work units (at a tails assay of 0.275% uranium 235) or, in terms of uranium 235, about 203,000 kilograms.

AVAILABLE CAPABILITY

Under the policy employed by the Commissions to date, each international agreement for cooperation providing for the transfer of enriched uranium has contained a "ceiling quantity" expressed in terms of kilograms of contained uranium 235. At the time of entering into such agreements for cooperation, that portion of AEC's enrichment capacity required to produce the quantity of enriched uranium specified in the ceiling of the agreement for cooperation has been internally allocated to the cooperating nation or group of nations. At such later time as each power reactor contemplated under the agreement comes into being, a toll enrichment services contract is executed providing for the long-term supply of enriched uranium for the project. Thus, under AEC's policy to date, production capacity has been allocated prior to actual execution of the supply contract.

With the growing maturity of the nuclear power industry and the increasing commitment of AEC's existing enrichment facilities, the Commission has determined that it is no longer necessary or desirable that the ceiling quantity stated in agreements for cooperation constitute an advance allocation of Commission production capacity. Accordingly, it is now anticipated that future agreements for cooperation will no longer constitute such an advance allocation of capacity. The allocation of capacity, as well as the supply commitment, will be made at the time of execution of individual supply contracts, which will occur at some time following a firm undertaking by the customer to proceed with the reactor project.

In accordance with the revised policy, the AEC has testified, and the European Community has acknowledged, that the proposed increase in the ceiling would not, by itself, represent a firm AEC commitment to supply the additional enriching services. Such a commitment only would arise on the execution of binding contracts.

The Commission also testified that if the ceiling were raised, any contractual commitment to supply the additional enriched material could be satisfied from the capacity of its present gaseous diffusion plants as supplemented by the Cascade Improvement Program and

the Cascade Upgrading Program. The AEC added that this would be accomplished without impairing the supply of uranium enriching services for our domestic facilities.

CHANGE IN THE MANNER IN WHICH THE CEILING IS EXPRESSED

A new method has been used in the bill to express the total amount of enriched uranium which would be authorized by this legislation for distribution to EURATOM by the Commission. The AEC considers this new method of expression to be desirable in light of recent changes in the enriched uranium supply policies of the Commission. In the case of EURATOM, this change also involves a revision in the method of calculating and expressing the amounts authorized for transfer to the European Atomic Energy Community pursuant to the EURATOM Cooperation Act.

First, the Commission has advised that it plans to return to its former practice of calculating the ceiling amounts on the basis of five years' advance needs, rather than the present three years, advance calculation. Five years is considered to be a more reasonable planning period and necessary to provide adequate time in which to accommodate necessary revisions in an initial plan. In the case of nations having substantial nuclear power programs, such revisions are almost certain to be required. Since the ceiling quantity in the agreements for cooperation no longer constitutes an advance allocation of production capacity, this revision will not result in an increased encumbrance upon production capacity.

Second, as indicated earlier, the ceiling will be expressed in terms of the amount of uranium 235 required to support the fuel cycle of reactors having a specified number of total megawatts of electric energy. Although this basis does not permit establishing a completely definitive uranium 235 ceiling, this fact is not considered a major disadvantage since under the new approach the ceiling does not constitute a supply undertaking. Rather, the maximum amount of separative work which the U.S. is committed to supply will only be established in the supply contracts executed under the agreement. However, by use of appropriate conversion factors, the maximum amount of separative work (or equivalent uranium 235) which could be transferred under the agreement may be computed quite closely for planning purposes. (Appendix 2)

The Committee agrees with the AEC that there are a number of advantages in shifting to the megawatt ceiling basis. Among these are:

1. Installed power capacity is, in any event, the basic assumption from which either separative work or uranium 235 requirements must be derived;
2. A megawatt ceiling is simpler and more readily understood;
3. Since domestic enrichment requirements normally are expressed in terms of the number of megawatts of installed capacity by a given date, expressing the foreign ceiling in comparable terms will facilitate comparison between foreign and domestic requirements;
4. A megawatt ceiling will avoid the necessity of having to make relatively minor adjustments resulting from such factors

as a change in the type of power reactor planned at the time the agreement is negotiated and from technical revisions in the assumed fuel cycle; and

5. A megawatt ceiling will make unnecessary some detailed AEC internal record keeping, without compromising in any way the data needed for safeguards purposes.

The Committee also notes that the Agreement for Cooperation with the Government of Japan recently was amended to permit the transfer of increased quantities of enriched uranium to fuel its expanded nuclear power program, and that the ceiling in that agreement was expressed in terms of installed megawatts of electrical capacity (60,000 Mwe).

The Committee also agrees that it is not feasible to express requirements for enriched uranium for use other than in the fuel cycle of Community power reactors in terms of megawatts. Therefore, as a result of the requirements of Section 54 of the Atomic Energy Act, it appears necessary that a contained uranium 235 ceiling be retained in the EURATOM Cooperation Act for such other purposes. Thus, a total of 25,000 kilograms of contained uranium 235 also is provided in the proposed amendment for such other purposes, including the fueling of research and test reactors, third country fabrication and chemical processing, and for such other applications as are included within the scope of the Additional Agreement for Cooperation. Based on an AEC analysis of past experience and anticipated types and magnitudes of such applications, it appears that the 25,000 kilogram estimate is reasonable.

Combining these new enrichment requirements of the Community with those provided for previously under the EUARTOM Cooperation Act, as amended, and converting to the new megawatt ceiling basis, the total quantity of contained uranium 235 becomes that required in the fuel cycle of power reactors having an installed capacity of 35,000 megawatts (electric) plus a total of 25,000 kilograms of uranium 235 for other purposes. The corresponding estimate of enriched uranium required is 583,000 kilograms of contained uranium 235.

GENERAL

All enriched material which would be transferred to the Community under contracts authorized by this amendment would continue to be subject to the applicable Agreements for Cooperation with EURATOM. Among other things, these agreements include provisions for the safeguards against the diversion of special nuclear material to military applications.

Deliveries of the additional uranium 235 authorized by this amendment are not expected to take place for several years. Hence, when delivered, such uranium 235 will presumably be subject to the safeguards provided for in the agreement recently negotiated between the International Atomic Energy Agency, EURATOM, and certain member states of the latter, to meet the requirements of the Non-Proliferation Treaty. In this connection, a recent amendment to the U.S.-EURATOM Additional Agreement for Cooperation (Feb. 28,

1973) provides that the undertakings thereunder are subject not only to enactment of the legislation here involved, but also to the provisions of applicable laws, treaties, regulations and license requirements in effect in the United States, in the Community and within the Member States. Thus, all transfers of special nuclear material by the U.S. to the five non-nuclear-weapons States of EURATOM pursuant to the authority of the proposed amendment to the EURATOM Cooperation Act will be subject to our Treaty obligations of which NPT safeguards are a part.

The Committee believes that this increase in the authorization to transfer enriched material to EURATOM represents a logical continuation of this Government's previous policy of supplying enriched uranium to the Community. As noted above, it is expected that almost all the additional enriched uranium provided for by this authorization would be distributed to EURATOM through the provision of uranium enrichment services under AEC contracts at prices no less than those charged domestic customers.

Assuming that all of the additional uranium 235 is transferred to EURATOM through uranium enrichment services, the revenues to the United States for these services would be approximately \$2 billion.

At the present separative work charge of \$32 per SWU, revenues to the U.S. through 1995, if the entire 91 million SWU ultimately were to be sold in the Community under toll enrichment services contracts, would be in the order of \$3.1 billion. At present, enrichment services contracts already concluded with Community organizations have an estimated value of about \$724 million; in addition, there are significant continuing revenues under straight sales, deferred payment sales, and lease contracts. It is expected that there would be additional revenue to U.S. industry from these transactions as a result of sales of supportive materials and services and from the sale of reactor equipment.

If the projected uranium 235 requirements should prove excessive to EURATOM's actual needs, the U.S. will not be obligated to deliver such excess amounts. This results from AEC's new policy of not entering into a firm supply commitment until a supply contract is executed.

SECTION-BY-SECTION ANALYSIS

This bill would amend Sec. 5 of the EURATOM Cooperation Act of 1958, as amended, to increase the maximum amount of contained uranium 235 which may be transferred to the European Community from 215,000 kilograms to that which would be necessary to support the fuel cycle of power reactors located in the Community having a total installed capacity of 35,000 megawatts of electrical energy together with 25,000 kilograms of uranium 235 for other purposes. In terms of kilograms of contained uranium 235, the total increase would be the equivalent of 368,000 kilograms. The ceiling would serve to set an upper limit on the amount of uranium enriching services which may be provided to the Community under contracts with the AEC. An actual commitment to supply any amount of enriched uranium would not occur until the execution of specific supply contracts.

COST OF LEGISLATION

Since the increase in the ceiling on the amount of contained uranium 235 does not constitute a commitment to furnish special nuclear material to the Community, in accordance with Section 252(a) of the Legislative Reorganization Act of 1970 (Public Law 91-510), the Joint Committee has determined that the Atomic Energy Commission will incur no costs in carrying out this legislation during this fiscal year and in the five succeeding fiscal years.

The bill does, however, provide for increasing the number of separative work units (SWU's) of enriched uranium that could be supplied under the Euratom Cooperation Act of 1958, as amended, by a total of 57 million SWU's. The AEC's charge per SWU, effective August 14, 1973, amounts to \$38.50 for requirements-type contracts or a reduced charge of \$36.00 for firm commitments-type contracts. Under section 161 v of the Atomic Energy Act, this charge is established by the AEC on a basis that will assure that revenues are sufficient to recover appropriate Government costs projected over a reasonable period of time. In this regard, the AEC has made a five-year estimate of the revenues which would be expected from the sale of the 57 million SWU's and which approximate appropriate Government costs. The estimate is as follows:

<i>Estimated revenues in millions</i>	
Fiscal year:	
1975 -----	\$422
1976 -----	430
1977 -----	440
1978 -----	449
1979 -----	459

The Committee has no information upon which to predict any future level of revenues different from those projected by the Commission.

CHANGES IN EXISTING LAW

In accordance with subsection (4) of rule XXIX of the Standing Rules of the Senate, changes in existing law recommended by the bill accompanying this report are shown as follows (deleted material is enclosed in black brackets, new matter printed in italic, and existing law in which no change is proposed is shown in roman):

PUBLIC LAW 85-846

[EURATOM Cooperation Act of 1958, as amended]

AN ACT To provide cooperation with the European Atomic Energy Community

* * * * *

SEC. 5. Pursuant to the provisions of section 54 of the Atomic Energy Act of 1954, as amended, there is hereby authorized for sale or lease to the Community—

an amount of contained uranium-235 which does not exceed that necessary to support the fuel cycle of power reactors located within the Community having an installed capacity of 35,000 mega-

watts of electric energy, together with 25,000 kilograms of contained uranium 235 for other purposes; [two-hundred-fifteen-thousand-kilograms-of-contained-uranium-235] "one thousand five hundred kilograms of plutonium; and "thirty kilograms of uranium-233;

In accordance with the provisions of an agreement or agreements for cooperation between the Government of the United States and the Community entered into pursuant to the provisions of section 123 of the Atomic Energy Act of 1954, as amended: *Provided*, That the Government of the United States obtains the equivalent of a first lien on any such material sold to the Community for which payment is not made in full at the time of transfer. The Commission may enter into contracts to provide, after December 31, 1968, for the producing or enriching of all, or part of, the above-mentioned contained uranium 235 pursuant to the provisions of sub-section 161v(b) of said Act, as amended, in lieu of sale or lease thereof.

* * * * *

APPENDIX 1

CHAPTER 5.—PRODUCTION OF SPECIAL NUCLEAR MATERIAL

SEC. 54. FOREIGN DISTRIBUTION OF SPECIAL NUCLEAR MATERIAL

The Commission is authorized to cooperate with any nation by distributing special nuclear material and to distribute such special nuclear material, pursuant to the terms of an agreement for cooperation to which such nation is a party and which is made in accordance with section 123. Unless hereafter otherwise authorized by law the Commission shall be compensated for special nuclear material so distributed at not less than the Commission's published charges applicable to the domestic distribution of such material, except that the Commission to assist and encourage research on peaceful uses or for medical therapy may so distribute without charge during any calendar year only a quantity of such material which at the time of transfer does not exceed in value \$10,000 in the case of one nation or \$50,000 in the case of any group of nations. The Commission may distribute to the International Atomic Energy Agency, or to any group of nations, only such amounts of special nuclear materials and for such periods of time as are authorized by Congress: *Provided*, however, That, notwithstanding this provision, the Commission is hereby authorized subject to the provisions of section 123, to distribute to the Agency five thousand kilograms of contained uranium 235, five hundred grams of uranium 233 and three kilograms of plutonium together with the amounts of special nuclear material which will match in amount the sum of all quantities of special nuclear materials made available by all other members of the Agency to July 1, 1960.

APPENDIX 2

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., April 11, 1973.

Mr. E. J. BAUSER,
Executive Director, Joint Committee on Atomic Energy, Congress of
the United States

DEAR MR. BAUSER: At your request, we checked the data on enrichment ceilings for Euratom transmitted by your letter of April 2, 1973, and are in agreement with the numbers, with the two following exceptions.

1. We find what appears to be a transposition of numbers as shown in the Bill Analysis in the quantity of kilograms of contained U-235 required to fuel the proposed additional 15,000 megawatts of power. The number of kgs of U-235 for this purpose should read '203,000' rather than '230,000'. This correction is reflected in the table below.

2. We have updated the status of our present commitments under the existing ceiling of 215,000 kgs of contained U-235 to more accurately reflect the current contracting position.

A table reflecting these changes is presented below:

EURATOM ENRICHMENT CEILINGS

	SWU (0.275 tails (millions))	Amount
Present commitments of contained U²³⁵ (kgs):		
Contracted.....	30.9	195,000
Remaining.....	3.1	20,000
Total.....	34.0	215,000
Additional requirements for contained U²³⁵ (kgs):		
To complete fuelling of 20,000 MW.....	22	140,000
To fuel 15,000 MW.....	32	203,000
Other than power.....	3	25,000
Total additional.....	57	368,000
Grand total.....	91	583,000

Sincerely,

A. S. FRIEDMAN,
Director, Division of International Programs.

APPENDIX 6



Public Law 93-88
93rd Congress, S. 1993
August 14, 1973

An Act

87 STAT. 296

To amend the EURATOM Cooperation Act of 1958, as amended.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 5 of the EURATOM Cooperation Act of 1958, as amended, is amended by deleting the words "two hundred fifteen thousand kilograms of contained uranium 235" and substituting therefor the words "an amount of contained uranium 235 which does not exceed that necessary to support the fuel cycle of power reactors located within the Community having a total installed capacity of thirty-five thousand megawatts of electric energy, together with twenty-five thousand kilograms of contained uranium 235 for other purposes".

EURATOM
Cooperation
Act of 1958,
amendment.
81 Stat. 578.
42 USC 2294.

Approved August 14, 1973.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 93-385 accompanying H.R.8867 (Joint Committee on Atomic Energy).

SENATE REPORT No. 93-341 (Joint Committee on Atomic Energy).

CONGRESSIONAL RECORD, Vol. 119 (1973):

July 26, considered and passed Senate.

July 30, considered and passed House, in lieu of H.R.8867.

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