

Memorandum of Understanding regarding the proposed Joint Nuclear Power Programme between Euratom and the United States (Brussels, 29 May 1958)

Caption: On 29 May 1958, in Brussels, the United States and the six Member States of Euratom sign a memorandum setting out the terms of the joint agreement for technical cooperation in the field of nuclear energy.

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Memorandum of Understanding Regarding the Joint Nuclear Power Program Proposed Between the European Atomic Energy Community (EURATOM) and the United States of America

The steps taken by the Member States of the European Atomic Energy Community (EURATOM) toward a united Europe and the consistent support of the United States for their efforts are an acknowledgment that, in a world being rapidly transformed by technical and political change, the problems our countries face call for increasing solidarity.

The Member States of EURATOM urgently need nuclear power to be in a position to meet future energy requirements and to assure continued economic progress.

Both EURATOM and the United States must carry through the nuclear revolution in industry with maximum speed and efficiency in order to remain in the forefront of progress and to open new horizons for further economic and social advance.

In order to achieve these objectives a large-scale joint development program of power reactors will be launched.

EURATOM will benefit by the experience and capacity which the United States can provide to make a quick start on such a program. This will in turn provide the United States with the opportunity to accelerate its own industrial development of nuclear power for peaceful purposes by associating itself with the program. Conventional energy is generally more costly in Europe than in the United States, so that nuclear power approaches the competitive range of energy costs in Europe, a stage which will be reached only later in the United States.

For these reasons, the Commission of the European Atomic Energy Community and the Government of the United States of America have agreed to this Memorandum of Understanding which outlines a joint United States–EURATOM development program of large-scale nuclear power reactors to be constructed in the European Atomic Energy Community in the next few years.

The aim of the joint program will be to bring into operation in the Community by 1963 about 1,000,000 electrical kilowatts of installed nuclear capacity in reactors of proven types developed in the United States, thus increasing substantially the total capacity envisaged by existing programs in the Member States. The program is consistent with, and in fact a point of departure toward, the program outlined in “A Target for EURATOM”.¹

It is understood that the establishment and initiation of the joint program is subject to appropriate statutory steps, including authorization by the competent bodies of the Community and of the Government of the United States.

The joint program will be conducted so as to obtain the maximum support of the industries of the Community and the United States; indeed, their active participation is indispensable to the success of the program.

It is the hope and expectation of the Commission and the Government of the United States that the proposed program will lead to further cooperation between the Community and the United States in other fields related to the peaceful uses of atomic energy.

They also see in the joint program a new type of cooperation among allies on a fully equal footing based on organic links forged by common effort, and holding out hopes of new steps for the further development of the Atlantic Community.

The Commission of the European Atomic Energy Community and the Government of the United States reaffirm their dedication to the objectives of the International Atomic Energy Agency and intend that the

results of their program will benefit the Agency and the nations participating in it.

1. Objectives

The objectives of the joint program will be:

A. To bring into operation by 1963, within the European Atomic Energy Community, large-scale power plants using nuclear reactors of proven types, on which research and development has been carried to an advanced stage in the United States, having a total installed capacity of approximately one million kilowatts of electricity and under conditions which would approach the competitive range of conventional energy costs in Europe.

B. To initiate immediately a joint research and development program centered on these types of reactors.

2. Selection and approval under the program

Under the joint program, reactor projects may be proposed, constructed and operated by private or governmental organizations engaged in the power industry or in the nuclear energy field.

The Commission and the Government of the United States will establish jointly, technical standards and criteria (including those relating to radiation protection and reactor safety) and the procedures for selection and approval of reactor projects under this program.

In the evaluation and selection of such reactor projects, the technical and economic features will be considered and approved jointly by the Commission and the United States Government.

Other features of such reactor projects will be considered and approved by the Commission.

Reactors now being planned or constructed in Member States of the Community will be eligible for, and will receive, early consideration under the criteria established pursuant to this section.

It is intended to take and announce decisions on the above matters at the earliest practicable date.

3. Capital costs

The total capital cost² of the nuclear power plants with an installed capacity of approximately one million kilowatts of electricity to be constructed under the program is presently estimated not to exceed the equivalent of \$350,000,000 to be financed as follows:

A. Approximately \$250,000,000 to be provided by the participating utilities and other European sources of capital, such financing to be arranged with the appropriate assistance of EURATOM; and

B. Up to \$135,000,000 to be provided by the United States Government to EURATOM in the form of a long-term line of credit on terms and conditions to be agreed, such funds to be re-lent by EURATOM for the construction of facilities under this program.

4. Fuel cycles

The Commission and the Government of the United States will enter into special arrangements with respect to the fuel cycle for reactors to be constructed and operated under the proposed program according to the principles set forth in Attachment "A" to this memorandum.

5. Chemical processing

The United States Atomic Energy Commission is prepared to process in its facilities, at established U.S.

domestic prices, spent fuel elements from the reactors to be included in the present program. The United States Atomic Energy Commission agrees to assist in the development of chemical processing techniques in Europe by providing technical advice and assistance both to “Eurochemic” (which is to design and build a pilot plant at Mol, Belgium), and to the Community in the design and construction of future plants which the Community may decide to design and construct, or to sponsor.

6. Research and development

A. The Commission and the Government of the United States intend to initiate promptly a joint program of research and development to be conducted both in the United States and in Europe on the types of reactors to be constructed under the proposed program.

This research and development program will be aimed primarily at the improvement in performance of these reactors, and at lowering fuel cycle costs.

It will also deal with plutonium recycling and other problems relevant to these reactors, thus contributing to the over-all advance of the nuclear power art.

The research and development program will be established for a ten (10) year period. During the first five (5) years the financial contribution of the Community and the United States will amount to about \$50,000,000 each. Prior to the completion of the first five-year period, the Parties will determine the financial requirements for the remaining five-year period and will undertake to procure funds necessary to carry out the program. Funds for the second five-year period may be in the same order of magnitude.

The administration of this program will be conducted under mutually agreed arrangements.

B. In addition, both the Commission and the United States Atomic Energy Commission will push forward and extend their own research and development programs, either direct or sponsored, on all peaceful aspects of nuclear science and industry, in particular in such fields as advanced civilian reactor design, fuel technology, reactor operation, chemical processing, radioisotopes utilization, waste disposal, and public health.

Information resulting from such work outside of the joint program will be exchanged by the respective Commissions fully and promptly.

7. Special nuclear and other materials

The Government of the United States will make available to the Community, as needed, enriched uranium for the nuclear power reactors to be included within the proposed program, in sufficient quantity to meet inventory and operating requirements for a twenty (20) year operating period.

The Government of the United States also will provide the Community special nuclear materials as may be agreed for research and development and the operation of research and test reactors associated with the proposed power program, in sufficient quantity to meet inventory and operating requirements for a twenty (20) year operating period. In addition, source material, special reactor material and other materials needed for carrying out the program will be provided under terms and conditions to be agreed upon.

8. Availability of information

A. Nonpatentable information developed in joint program

1) The program contemplated by this Memorandum of Understanding, including projects selected for inclusion therein, should serve to benefit other projects and programs (both private and governmental) within the Community and the United States. Accordingly, under mutually agreed arrangements, all information developed in connection with the joint program of research and development, and all

information developed in connection with the selected projects, concerning design, plans and specifications, construction costs, operations and economics, will be delivered currently to the Parties as developed and may be used, disseminated, or published by each Party for any and all purposes as it sees fit without further obligation or payment. There will be no discrimination in the dissemination or use of the information for the reason that the proposed recipient or user is a national of the United States or of any Member State of EURATOM.

2) Both Commissions shall have access to the records of the participating contractors pertaining to their participation in research and development projects under the joint research and development program, or pertaining to the performance of fuel elements that are the subject of United States guarantees.

3) The Parties will further expedite prompt exchange of information through symposia, exchange of personnel, setting up of combined teams, and other methods as may be mutually agreed.

B. Patentable information

As to any invention made or conceived in the course of or under the joint program of research and development:

1. The United States shall without further obligation or payment be entitled to assignment of the title and rights in and to the invention and the patent in the United States subject to a non-exclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the Community for all purposes.

2. The Community shall without further obligation or payment be entitled to assignment of the title and rights in and to the invention and the patents in the Community subject to a non-exclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the United States for all purposes.

3. With respect to title and rights in and to the invention and patents in third countries:

a. The Community, if the invention is made or conceived within the Community or the United States, if the invention is made or conceived within the United States, shall be entitled to assignment of such title and rights, subject to a non-exclusive, irrevocable, royalty-free license, with the right to grant sublicenses, to the other for all purposes.

b. If the invention is made or conceived elsewhere, the Party contracting for the work shall be entitled to assignment of such title and rights, subject to a non-exclusive, irrevocable, royalty-free license, with the right to grant sublicenses, to the other for all purposes.

C. As to inventions and patents under paragraph B of this article neither Party shall discriminate in the granting of any license or sublicense for the reason that the proposed licenses or sublicenses is a national of the United States or any Member State.

D. As to patents used in the work of the joint program, other than those under paragraph B, which the United States owns or as to which it has the right to grant licenses or sublicenses, the United States will agree to grant licenses or sublicenses, covering use either in or outside the joint program, on a non-discriminatory basis to a Member State and to industry of a Member State, if the Member State has agreed to grant licenses or sublicenses as to patents used in the work of the joint program which it owns or as to which it has the right to grant licenses or sublicenses, on a non-discriminatory basis to the United States and to industry of the United States, covering use either in or outside the joint program.

E. The respective contractual arrangements of the Parties with third parties shall contain provisions that will enable each Party to effectuate the foregoing provisions of B and C as to patentable information.

F. It is recognized that detailed procedures shall be jointly established to effectuate the foregoing provisions and that all situations not covered shall be settled by mutual agreement governed by the basic principle of

equivalent benefits to both Parties.

9. Training

The Commission and the United States Atomic Energy Commission will work closely together to develop training programs to satisfy the requirements of the programs described in this memorandum. The United States Atomic Energy Commission will assist the Commission in satisfying these needs by making its facilities and experience available.

10. Cooperative activities in industry

It is expected that the program to be initiated under the terms of this Memorandum of Understanding will increase the cooperation already existing between individuals and organizations, both privately and publicly owned, engaged in nuclear industry, in the United States and in the countries of the Community.

The Commission and the Government of the United States will use their best efforts to foster such cooperation.

11. Safeguards and controls

Both EURATOM and the United States recognize the extreme importance of assuring that all activities under the joint program shall be directed solely toward the peaceful uses of atomic energy. In accord with this objective:

A. EURATOM guarantees that:

1. No material, including equipment and devices, transferred pursuant to the Agreement for Cooperation between the United States and the Community to the Community or to authorized persons within the Community will be used for atomic weapons, or for research on or development of atomic weapons, or for any other military purpose;
2. No such material will be transferred to unauthorized persons or beyond the control of the Community, except as the United States might agree to such a transfer and then only if the transfer of the material is within the scope of an Agreement for Cooperation between the Government of the United States of America and another nation or group of nations;
3. No source or special nuclear material utilized in, recovered from, or produced as a result of the use of materials, equipment, or devices transferred pursuant to the Agreement for Cooperation between the United States and the Community to the Community or authorized persons within the Community will be used for atomic weapons, or for research on or development of atomic weapons, or for any other military purpose;
4. The Community will establish and maintain a mutually satisfactory system of safeguards and controls, to be applied to materials, equipment, and devices subject to the guarantees set forth in paragraphs 1 through 3 above.

B. EURATOM undertakes the responsibility for establishing and implementing a safeguards and control system designed to give maximum assurance that any material, equipment, or devices made available pursuant to the Agreement between the United States and EURATOM and any source or special nuclear material derived from the use of such material, equipment or devices, shall be utilized solely for peaceful purposes. In establishing and implementing its safeguards and control system the Community is prepared to consult with and exchange experience with the International Atomic Energy Agency with the objective of establishing a system reasonably compatible with that of the International Atomic Energy Agency.

The United States and EURATOM will formulate and agree upon the principles which will govern the establishment and operation by EURATOM of a mutually satisfactory safeguards and control system under

the Agreement for Cooperation between the United States and EURATOM. These principles are set forth in Attachment "B" and will be included in the text of the Agreement.

C. As has been requested by EURATOM, the United States will provide assistance in establishing the EURATOM safeguards and control system, and will provide continuing assistance in the operation of the system.

D. There will be frequent consultations and exchanges of visits between the Parties to give assurance to both Parties that the EURATOM safeguards and control system effectively meets the responsibility and principles stated in B above and that the standards of the materials accountability systems of the United States and EURATOM are kept reasonably comparable.

E. In recognition of the importance of the International Atomic Energy Agency, the United States of America and the European Atomic Energy Community will consult with each other from time to time to determine whether there are any areas of responsibility with regard to safeguards and control and matters relating to health and safety in which the Agency might be asked to assist.

F. A continuation of the cooperative program between the United States and EURATOM will be contingent upon EURATOM establishing and maintaining a mutually satisfactory and effective safeguards and control system which is in accord with the principles originally agreed upon.

12. Third party liability

The Community and the Government of the United States recognize that adequate measures to protect equipment manufacturers and other suppliers as well as the participating utilities against now uninsurable risk are necessary to the implementation of the joint program. The EURATOM Commission will seek to develop and to secure the adoption, by the earliest practicable date, of suitable measures which will provide adequate financial protection against third party liability. Such measures could involve suitable indemnification guarantees, national legislation, international convention, or a combination of such measures.

13. Tariffs

The Commission will take all action open to it under the Treaty to minimize the impact of customs duties on goods and products imported under this joint program.

14. Existing agreements

Existing agreements for cooperation in the field of nuclear energy between Member States and the United States of America are not modified by the joint program, but will be subject to appropriate negotiations pursuant to article 106 of the Treaty. Modifications may be made as necessary to permit transfers of reactor projects now contemplated under existing agreements that qualify for and are accepted under the joint program.

15. Administration of the program

In order to assure the initiation and effective execution of this program, agreement will be reached on the overall organization needed to establish and carry out the joint program, including the establishment of such joint groups as are required.

The Commission of the European Atomic Energy Community (EURATOM)

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Enrico Medi
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The United States of America

John Foster Dulles
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At Brussels on May 29, 1958, and at Washington on June 12, 1958.

¹ Report submitted by Mr. Louis Armand, Mr. Franz Etzel and Mr. Francesco Giordani at the request of the Governments of Belgium, France, the Federal Republic of Germany, Italy, Luxembourg and the Netherlands.

² Exclusive of the fuel inventory.

Attachment “A”: Principles for the Special Arrangements With Respect to the Fuel Cycles for Reactors To Be Constructed and Operated Under the Program

A. Objective

The objective of the fuel cycle program is that arrangements for supplying fuel elements for the million kilowatt cooperative program will meet either criterion (1) or (2) below:

(1) The integrity of the stainless steel or zirconium clad fuel elements for light-water cooled and moderated reactors is guaranteed to an average irradiation level ³ of 10,000 megawatt days per metric ton of contained uranium; ⁴ and the charge ⁵ for fabrication of fuel elements starting with uranium hexafluoride is:

(a) \$100 per kilogram of contained uranium for fuel elements made of uranium dioxide having a U-235 isotopic concentration no greater than 3% by weight, diameter between 0.25 and 0.50 inches, and stainless steel cladding; or

(b) \$140 per kilogram of contained uranium for similar fuel elements clad with zirconium cladding; or

(c) appropriately adjusted charges for fuel elements having different claddings or falling outside of the limitation on size, shape, or U-235 concentration.

Note: For each type of fuel element, there will be computed, as mutually agreed, “computed fuel cycle costs” based on guaranteed average irradiation levels and fabrication charges, and taking into account all charges for fuel fabrication, inventory, burnup, chemical reprocessing, and transportation and the credit for plutonium. If the irradiation level and fabrication charge used in this computation are those given in A (1), the computed fuel cycle cost is defined as the “standard fuel cycle cost”.

(2) The irradiation level in the integrity guarantee and the fabrication charge for fuel elements differ from the values specified in (1), but the combination gives a computed fuel-cycle cost equal to or less than the standard fuel-cycle cost.

B. Guarantees

1. Arrangements for supplying fuel elements that meet criterion (1) or (2) may be received from commercial sources but, in the event of failure of fuel elements, such arrangements may not sufficiently cover the extra costs of reprocessing and transporting irradiated fuel elements to meet the standard fuel-cycle cost. Under such conditions, the United States Commission will, for the purposes of prorating the chemical processing

and/or transportation costs, offer to guarantee an average irradiation level, which, in combination with the guarantees offered by the manufacturer, would result in a computed fuel-cycle cost equal to the standard fuel-cycle cost. When such guarantees are made, if the average irradiation level actually attained is greater than the irradiation level guaranteed by the United States Commission, one-half of the resulting savings in costs of reprocessing and/or transporting irradiated fuel will be credited to the United States Commission, up to the sum of previous payments by the United States under this guarantee for the particular reactor concerned.

2. In the event that acceptable arrangements for supplying fuel elements meeting the criteria of A above are not received from commercial sources, the United States Commission will guarantee the fuel elements supplied under the following arrangements:

(a) If the fabrication charge guaranteed by the manufacturer is equal to or less than the value specified in A (1) above, the United States Commission will guarantee an average irradiation level which, when combined with this fabrication charge, will give a computed fuel-cycle cost equal to the standard fuel-cycle cost.

(b) If the average irradiation level guaranteed by the manufacturer is equal to or greater than the value specified in A (1) above, the United States Commission will guarantee a fabrication charge which, when combined with the average irradiation level in the manufacturer's integrity guarantee, will give a computed fuel-cycle cost equal to the standard fuel-cycle cost.

(c) If the average irradiation level is less and the fabrication charge is greater in the manufacturer's guarantee than in A (1) above, the United States Commission will offer to guarantee the values in A (1).

In cases (b) and (c) above, when the average irradiation level attained exceeds that guaranteed by the United States Commission, one-half of the resulting savings in fabrication costs will be credited to the United States Commission, up to the cost of payments by the United States Commission for fabrication charges for the particular core concerned.

If the average irradiation level does not meet that guaranteed in (a), (b), or (c) above, the United States Commission will adjust the charges for fabrication, chemical reprocessing, and transportation to the level that would have been incurred had that guarantee been met.

3. Fuel-element guarantees may also be developed for proven types of reactors other than light-water cooled and moderated, determined by the EURATOM Commission and the United States Commission to be eligible for consideration under the joint program.

4. The guarantees provided by the United States Commission under paragraphs 1, 2, or 3 of this section will be applicable to all loadings made in the reactor during ten years of operation or prior to December 31, 1973, whichever is earlier.

5. In determining whether a guaranteed average irradiation level has been attained, account will be taken not only of all material discharged because of actual failure of integrity, but also material whose discharge, in the joint opinion of the EURATOM Commission, the United States Commission, and the fabricator involved, was required for purposes of safe operation or economic operation (assuming for the latter determination that no guarantees were in force).

6. The technical and economic criteria under which proposals will be evaluated for acceptance will include minimum standards for fabrication charge and integrity guarantee for fuel elements. These criteria will also provide, as may be agreed, that subsequent reactor cores can be furnished by other than the initial fabricators.

7. In order to qualify for the guarantees by the United States Commission provided in paragraphs 1, 2, and 3 of this section, fuel elements must be fabricated by a United States manufacturer or by a manufacturer in

EURATOM countries under agreement with a United States firm or firms. However, reactors under the joint program may be fueled with elements from other sources. In such cases, the United States Commission will offer to perform chemical reprocessing services at its published charges with respect to any source or special nuclear material obtained from the United States. If adequate facilities are not available in EURATOM countries when needed, the United States Commission will give sympathetic consideration to furnishing reprocessing services on material not furnished by the United States Commission.

8. The United States Commission guarantees will, in general, be extended to the utility through the fabricator of the fuel. In the event that it is determined by the United States Commission that the fabricator is not meeting adequate performance standards, or, if it is mutually determined that a more advantageous source is available, other contractual arrangements will be made for supplying fuel elements under the guarantee.

Attachment “B”: Principles for Establishing the Safeguards and Control System Under the Agreement for Cooperation

The principles which will govern the establishment and operation of the safeguards and control system are as follows:

The EURATOM Commission will:

1. Examine the design of equipment, devices and facilities, including nuclear reactors, and approve it for the purpose of assuring that it will not further any military purpose and that it will permit the effective application of safeguards, if such equipment, devices and facilities:
 - a. are made available pursuant to this Agreement; or
 - b. use, process or fabricate any of the following materials received from the United States: source or special nuclear material, moderator material or any other material relevant to the effective application of safeguards; or
 - c. use any special nuclear material produced as the result of the use of equipment or material referred to in a and b.
2. Require the maintenance and production of operating records to assure accountability for source and special nuclear material made available or source or special nuclear material used, recovered, or produced as a result of the use of source or special nuclear material, moderator material or any other material relevant to the effective application of safeguards, or as a result of equipment, devices and facilities made available pursuant to this Agreement.
3. Require that progress reports be prepared and delivered to the EURATOM Commission with respect to projects utilizing material, equipment, devices and facilities referred to in paragraph 2 above.
4. Establish and require the deposit and storage, under continuing safeguards, in EURATOM facilities of any special nuclear material referred to in 2 above which is not currently being utilized for peaceful purposes in the Community or otherwise transferred as provided in the Agreement for Cooperation between the United States and the Community.
5. Establish an inspection organization which will have access at all times:
 - a. to all places and data, and
 - b. to any person, who by reason of his occupation deals with materials, equipment, devices or facilities safeguarded under this Agreement,

necessary to assure accounting for source or special nuclear material subject to paragraph 2 and to determine

whether there is compliance with the guarantees of the Community. The inspection organization will also be in a position to make and will make such independent measurements as are necessary to assure compliance with the provisions of this Attachment and the Agreement for Cooperation.⁶

³ Average irradiation level will be based on a weight of fuel equivalent to the nominal fuel loading of the reactor.

⁴ Adjustments of the integrity guarantee may be required if cladding materials other than stainless steel or zirconium are used.

⁵ Fabrication charges will be subject to escalation on the basis of a mutually determined index.

⁶ It is the understanding of the Parties that the above principles applicable to the establishment of EURATOM's inspection and control system are compatible with and are based on Article XII of the Statute of the International Atomic Energy Agency, Chapter VII of the EURATOM Treaty, and those adopted by the Government of the United States of America in its comprehensive Agreements for Cooperation.