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THE WHITE HOUSE

WASHINGTON

June 19, 1975

MEMORANDUM FOR:

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THROUGH:

JIM CAVANAUGH

FROM:

*Glen*  
GLENN SCHLEEDE

SUBJECT:

URANIUM ENRICHMENT - DRAFT FACT SHEET  
AND Q&A's

Enclosed are a revised fact sheet and a set of 14 of the more important questions and answers. We have attempted to take into account the excellent suggestions and contributions received from members of your staff who have commented on earlier drafts.

Would you please let me have your comments and corrections on this package by close of business, Friday, June 20. Additional Q&A's will be needed and suggestions are welcome. Thanks.

Attachment

cc: Jim Cannon  
Ron Nessen  
Bill Baroody  
Paul Theis



Fact Sheet



FACT SHEET

URANIUM ENRICHMENT

	<u>Page</u>
President's Announcement.....	1
Background.....	1
Plan Announced by the President.....	2
- Objectives	2
- Principal Elements of the Plan	2
. Legislative Authority for Cooperative Arrangements with Private Firms	2
- Assurances for Customers	3
- Controls and Safeguards	4
. Preventing the Diversion of Nuclear Materials	4
. Foreign Investment	4
. Environmental Impact, Safety and Anti-Trust	4
Implementing Actions.....	4
- Negotiations for a Diffusion Plant	4
- Request for Proposal for Centrifuge Plants	4
- Environmental Impact Statement	5
- Contingency Planning	5
- Diffusion Plant Design Work	5
Specifics of the Legislative Proposal.....	5
- Authorizing Legislation	5
. Basic Enabling Authority	5
. Contract Authority-Appropriations Request	5
- Review of the Contracts	6
Developments Leading to the President's Plan.....	6
- U.S. Leadership in Uranium Enrichment Technology	6
. Gaseous Diffusion	6
. Gas Centrifuge	6
. Laser Separation	6
- Existing U.S. Capacity	7
- The Growing Market	7
- Potential Foreign Suppliers	7

	<u>Page</u>
- The Program to Develop a Competitive Industry	7
. Diffusion Plant	7
. Centrifuge Plant	7
- Obstacles to Privatization	8
- Alternatives to Privatization	8
- The Proposal from Uranium Enrichment Associates (UEA)	9
- Centrifuge Enriching Projects -- Request for Proposals	9
Other Actions Related to Uranium Enrichment Capacity.....	10
- Increasing ERDA's Charge for Uranium Enrichment Services	10
- Contract Relief for Current ERDA Enrichment Customers	11

Attachments:

- #1 - Summary of UEA Plan and Proposal to ERDA
- #2 - Uranium Enrichment as a Part of the Nuclear Fuel Cycle

## FACT SHEET

### URANIUM ENRICHMENT

The President today announced administrative actions and a legislative proposal to (a) increase the United States' capacity to produce enriched uranium to fuel domestic and foreign nuclear power plants, (b) retain U.S. leadership as a world supplier of uranium enrichment services and technology for the peaceful use of nuclear power, and (c) assure the creation, under appropriate controls of a private, competitive uranium enrichment industry in the U.S. -- ending the current Government monopoly.

#### BACKGROUND

- . Natural uranium from U.S. and foreign mines must be refined or "enriched" before it can be used to make fuel for nuclear power plants which are used in the United States and in many foreign nations to generate electricity.
- . U.S. capacity for enriching uranium, which now supplies all domestic and most free world needs, consists of three Government-owned plants, located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio.
- . Since June 1974, the entire capacity of the three plants has been fully committed under long-term contracts. New enrichment capacity must be "on-line" beginning in about 1983 to meet the growing domestic and foreign demand for nuclear fuel.
- . The potential U.S. market abroad has begun to erode as some potential foreign customers have started looking to sources such as the U.S.S.R., France and a West European consortium for uranium enrichment.
- . Since 1971, the Executive Branch has followed policies and programs directed toward assuring that private industry -- rather than the Federal Government -- builds the next increments of U.S. uranium enrichment capacity.
- . Several industrial firms have sought to enter the uranium enrichment field but all have found that some type of Government assistance is needed to overcome the initial obstacles to private industry involvement.

PLAN ANNOUNCED BY THE PRESIDENT

Objectives. The plan announced by the President is designed to meet the objectives of assuring that:

- . The next increments of U.S. uranium enrichment capacity will be available when needed to meet the growing demand for fuel for nuclear powered generating plants in the U.S. and in other nations.
- . The U.S. maintains its role as the principal world supplier of uranium enrichment services and nuclear power plants --
  - Our economy and our world trade position.
  - Our ability to return to the position of a major world supplier of energy for the future.
  - Our efforts to obtain the commitment of additional nations to principles of nuclear non-proliferation.
  - Our cooperation with other major oil consuming nations which are looking to nuclear power to help reduce their dependence on foreign oil imports.
- . All future increments of capacity will be built, financed and operated by private industry -- rather than by the Federal Government -- so that a competitive industry will exist at the earliest possible date and with little or no cost to taxpayers.
- . All necessary domestic and international controls over nuclear materials and classified technology will be maintained, as they would be if the Government were to own the new plants.

Principal Elements of the Plan.

- . Legislative Authority for Cooperative Arrangements with Private Firms. The President is asking the Congress to enact promptly the additional legislative authority needed to enable the Energy Research and Development Administration (ERDA) to enter into cooperative arrangements with private industrial organizations that wish to build, own and operate uranium enrichment plants.
  - These arrangements would provide for certain types of assistance found to be necessary after detailed negotiations with firms submitting proposals.
  - Negotiations would be directed toward the agreements most advantageous to the Government and the public interest and with the largest risk to the private firm that is consistent with the objective of creating a private, competitive uranium enrichment industry.

Arrangements could include:

- Assuming of assets and liabilities of a private uranium enrichment project if the venture threatened to fail -- at the call of the private venture or the Government, and with compensation to the private venture ranging from full reimbursement to total loss of its equity interest, depending upon the circumstances leading to the threat of failure.
- Assuming the delivery of uranium enrichment services to customers placing orders with private enrichment firms that enter into the proposed contracts with the Government.
- Supplying Government-owned technology and warrant that technology -- for which the Government will receive royalty payments.
- Selling certain materials and supplies which, because of their classified nature, are available only from the Federal Government.
- Buying enriching services from or providing enriching services to private producers from the Government stockpile to accommodate an earlier or later than planned plant start-up date.

The arrangements would be spelled out in a detailed contract which would be subject to Congressional review.

The arrangements would end after one full year of commercial operation.

The Government would monitor progress carefully to be sure that the project continued on time and within cost estimates so that the Government could exercise its right to take over the project if necessary without any significant loss of time in getting the plant on line.

Assurances for Customers. The President announced his pledge to domestic and foreign customers who place orders with private U.S. suppliers that the Government will assure that the orders will be filled as services are needed.

- . Arrangements contemplated with private industry would assure that additional capacity will be on line when needed, with the Government taking over projects and completing them, if necessary.
- . Orders placed with private firms will be filled in the order in which they are placed, with the Government providing the enrichment services in the unexpected event that a private venture failed.



Controls and Safeguards. The President announced that all necessary controls and safeguards will be maintained in all arrangements with private firms. Such controls and safeguards include:

- Preventing the Diversion of Nuclear Materials. The domestic and international safeguard requirements will be observed including:
  - Restrictions on foreign access to classified technology.
  - Export controls to assure that uranium enrichment services are provided only to customers in foreign nations that have signed the Non-Proliferation Treaty.
  - Plant physical security measures.
- Foreign Investment. Foreign investment in private uranium enrichment ventures will be encouraged but control and domination of the venture must remain with U.S. interests.
- Environmental Impact, Safety and Anti-Trust. Private ventures wishing to build plants will have to obtain from the Nuclear Regulatory Commission (NRC) a construction permit and an operating license. As a part of its review, the NRC must evaluate environmental, safety and anti-trust considerations as well as assure the safeguarding of nuclear materials and that control of firms remain in the U.S. -- as now required by the Atomic Energy Act. The Justice Department participates in the review of anti-trust considerations.

#### IMPLEMENTING ACTIONS

The President announced several administrative actions that are being taken now:

- Negotiations for a Diffusion Plant. ERDA is responding formally to a proposal from the Uranium Enrichment Associates (UEA) offering to enter into negotiations which could lead to the construction by UEA of a \$3.5 billion plant which would make use of gaseous diffusion technology and which would be on line by 1983.
- Request for Proposal for Centrifuge Plants. ERDA is issuing a new request for proposals from industrial firms interested in constructing enrichment facilities making use of centrifuge technology.

- . Environmental Impact Statement. ERDA will on June 30 issue for public review and comment a draft environmental impact statement covering its actions concerned with the expansion of uranium enrichment capacity.
- . Contingency Planning. ERDA will continue with backup contingency measures to help assure capacity will be ready in the unlikely event that industrial efforts falter. These measures include continuation of Government plant conceptual design activities, research and development on enrichment technologies, and technological assistance to the private sector on a cost recovery basis.
- . Diffusion Plant Design Work. ERDA will seek an initial agreement to purchase from UEA design work on components for the private diffusion plant that could be used in a Government plant -- if the private venture were unable to proceed.

#### SPECIFICS OF THE LEGISLATIVE PROPOSAL

The Congressional actions necessary to allow the private industry plan to proceed would involve several steps:

Authorizing Legislation. The legislation proposed today by the President includes:

- . Basic Enabling Authority which:
  - Would allow for ERDA to enter into cooperative arrangements outlined earlier with firms that wish to build, own and operate uranium enrichment facilities -- subject to the availability of appropriation authorization.
  - Provide authorization for appropriation for amounts up to \$4.2 billion -- which is an estimate of the total funding expenses in the unexpected event that all expected diffusion and centrifuge ventures failed and it were necessary for the Government to assume assets and liabilities of these ventures and take-over those plants. The Administration's expectation is that none of these funds would have to be expended, but the authorization is necessary under the recently enacted Budget Reform Act and to provide assurance to customers and to potential producers of the Federal Government's commitment.
- . Contract Authority-Appropriations Request. This portion of the bill, which would be handled by Appropriations Committees, would provide the contract authority for

appropriations in an amount up to \$1.2 billion which is the maximum Federal Government exposure in the event that it were necessary to assume assets and liabilities for the proposed \$3.5 billion diffusion plant. Again, expenditure of these funds is not considered likely.

Review of the Contracts. Once contracts were negotiated pursuant to the legislation outlined above, the Joint Committee on Atomic Energy would be notified and a period of 45 days would have to elapse before the contract would be valid -- to allow an opportunity for Congressional review of the results of ERDA's negotiations with private firms.

#### DEVELOPMENTS LEADING TO THE PRESIDENT'S PLAN

U.S. Leadership in Uranium Enrichment Technology. The United States is the recognized leader in technology for refining or "enriching" natural uranium to a form that can be used to make fuel for nuclear power reactors was developed and is owned by the Federal Government. Natural uranium contains only a small amount (approximately .7%) of the fissionable isotope U-235. In order to be useful to make fuel for nuclear reactors, the concentration of U-235 must be increased to about 3-4% through a process of separating off other isotopes. The technology was developed and is owned by the Federal Government. Certain details of the technology are classified. Principal U.S. technologies are:

- . Gaseous Diffusion. This technology which is now used in the three existing government-owned enrichment plants was developed in the 1940's. Over 30 years of large scale operating experience and process improvements has made the technology the most reliable and economical now available for commercial scale operations. There is general agreement that the next increment of capacity should make use of this technology.
- . Gas centrifuge. The gas centrifuge process of uranium enrichment provides an alternative to gaseous diffusion. If the projected economics of the process are realized, gas centrifuge may be a preferable process for the future. Full operation of a Government pilot plant is scheduled for early 1976. This technology probably will be used as subsequent increments of commercial capacity are added.
- . Laser Separation. ERDA is conducting a basic research program to determine whether this technology is technically or commercially feasible. It is too early to make judgments, and in any event, the technology would not be available in time to be used for the next several increments of needed enrichment capacity.

Existing U.S. Capacity. The three Government-owned uranium enrichment plants will, when currently authorized expansion is completed, have the capacity to produce enriched uranium needed to fuel about 320 large nuclear-powered electric generating plants in the U.S. and foreign countries.

The Growing Market. Current estimates are that the U.S. will require added enrichment capacity equal to 3 to 5 plants the size of any one of the three existing plants and that added capacity for total free world demands will equal 5 to 7 existing plants.

Potential Foreign Suppliers. The principal existing capacity for enriching uranium outside the U.S. is in the Soviet Union. A French diffusion plant (Eurodif) is expected to begin production in 1979 and its capacity is reported to be fully committed. A British-German-Dutch consortium (Urenco) plant will also begin operation in 1979. Additional plants are being discussed by France, Canada, South Africa and Australia.

The Program to Develop a Competitive Industry. The Atomic Energy Act of 1946 provides that "the development, use and control of atomic energy would be directed to ... strengthen free competition in private enterprise". An Executive Branch policy and program to encourage private industry to build the next increments of uranium enrichment capacity was announced in June 1971. Beginning in 1973, the Atomic Energy Commission (AEC) asked private firms to consider building, owning and operating enrichment plants and granted qualified U.S. firms access to classified aspects of the Government's work, under carefully controlled security conditions, in order that they might make their own assessment of the commercial potential for private enriching plants. A number of firms responded to the invitation from which several consortia have emerged which are interested in pursuing the possibility of building enrichment plants.

- . Diffusion Plant. One consortium -- the Uranium Enrichment Associates (UEA) -- is interested in constructing a \$3 billion gaseous diffusion plant equivalent to the expanded capacity of one of the 3 existing Government-owned plants.
- . Centrifuge Plant. Other firms and consortia -- Centar, Exxon Nuclear and Garrett Corporation -- have expressed interest in cooperative arrangements with the Federal

Government which would lead to demonstration gas centrifuge plants which could be expanded in the future to commercial scale plants. The AEC (predecessor to ERDA) requested proposals from industry to advance the demonstration of centrifuge technology. A modified request for proposals is being issued today.

Obstacles to Privatization. All firms interested in building, owning and operating a private plant have concluded that some form of Government assistance is essential to begin the transition to a private competitive industry. Among the factors that have contributed to this conclusion are:

- . The complexity of the undertaking, including the Federal ownership and the classification of the technology.
- . The large financial commitment required.
- . The inherent difficulties of ending a Government monopoly.
- . The recent financial situation of U.S. electrical utilities which are the customers for a plant. (Their long term contracts for uranium enrichment services must provide part of the security for the long term financing required.)
- . Some uncertainty as to the Government's commitment to achieve privatization.

Alternatives to Privatization. The principal alternatives to an immediate effort to achieve privatization include:

- . All future additions to capacity financed, built and owned by the Federal Government, thus continuing indefinitely the existing monopoly.
- . Government financing and ownership of one or more additional increments of capacity, followed by another attempt to achieve privatization.

A thorough review indicated that many of the concerns that had been expressed about one alternative or another applied to and can be dealt with almost equally for all alternatives. These include:

- . The ability to have the next increment of capacity on line when needed (now estimated about 1983).
- . Controls and safeguards involving classified technology and non-proliferation of nuclear materials.

- . Customers for the next increment, which are expected to be primarily foreign.
- . The ability to accommodate foreign investments in an enrichment plant.

This review led to the conclusion that the task of explaining and implementing the plan for achieving a private industry would be difficult and that a substantial effort would be required by both the Congress and the Executive Branch, but that the benefits of privatization justified the effort. The benefits of privatization include:

- . Little or no cost to taxpayers - compared to Federal funding of \$10 to \$15 billion for the next 3 to 5 plants -- which funds would not be recovered to the Treasury for many years. Under the President's plan, revenue of about \$90 to \$100 million per plant per year would flow to the Federal Treasury from industry, principally from royalty payments and taxes.
- . An early end to the Government monopoly in a type of commercial activity that is typically performed by private industry.
- . The growth associated with this industry will be in the private sector rather than the Federal Government.

The Proposal from Uranium Enrichment Associations (UEA).  
Uranium Enrichment Associates is a consortium currently consisting of Bechtel Corporation and the Goodyear Tire and Rubber Company. On May 30, 1975, UEA submitted a proposal to ERDA calling for cooperative arrangements with the Federal Government. The principal features of the UEA proposal are summarized in Attachment #1. Details of a cooperative agreement would be negotiated between UEA and ERDA prior to signing a contract.

Centrifuge Enriching Projects -- Request for Proposals.

- . In August of 1974 the Government announced a program expected to lead to several relatively small industry constructed demonstration projects.
- . Gas centrifuge technology has not yet been applied on a production scale sufficient to permit full industry commitment to large plants. At least three companies are interested in undertaking private centrifuge enriching projects now which would be scaled up progressively from small demonstration modules to projects of 2-3 million units per year capacity at which point the economies of scale for centrifuge enriching are expected to be largely realized.

- . A government-industry cooperative arrangement similar to that required for the UEA diffusion project may be required.
- . A Request for Proposals for this program which extends and elaborates upon the earlier program was issued today:
  - Proposals will be due on September 2 and it is the Government expectation that several proposals could be accepted to proceed more or less in parallel with each other and with the UEA project.
  - Proposers will describe their proposed project in detail, including plant design, size, location and schedules and specify the type and magnitude of Government support necessary to proceed.
  - Small initial modules, perhaps 200-300 thousand units per year could be in operation in the early 1980's with 2-3 million unit commercial scale plants achieved in the mid-1980's on a time frame consistent with the growth of the market.
- . Centrifuge technology permits adding small capacity increments as required to closely follow market needs.
- . The simultaneous development of several centrifuge enriching projects in the same time frame as installation of gaseous diffusion capacity helps assure development of a private, competitive enriching industry and of the maintenance of U.S. world leadership in this field.

#### OTHER ACTIONS RELATED TO URANIUM ENRICHMENT CAPACITY

##### Increasing ERDA's Charge for Uranium Enrichment Services.

- . The President announced in his 1976 Budget his intention to submit legislation to the Congress to raise the price of enrichment services from ERDA-owned plants. The new price would be established to not only recover the Government's costs, but to place the pricing of Government enriching services on a more business-like basis and thus to encourage private sector interest in building enrichment facilities. This new price would be calculated using a rate of return on investment more appropriate of the private sector than the Government's rate of return and would account for the loss of corporate income taxes.
- . This legislation was submitted to the Congress by ERDA on \_\_\_\_\_.

The current price charged by ERDA for uranium enrichment is based on a statutory formula which says that ERDA's charge must be established on the basis of the recovery of the Government's costs over a reasonable period of time. Application of the formula has resulted in a present charge of between \$42 and \$48 per separative work unit (SWU) depending on the type of contract a customer has with ERDA. This price will rise by the end of 1975 to \$53 and \$60 per unit. These prices reflect the low cost during the 1940's and 1950's primarily for military purposes. These prices are much lower than the quoted world market prices of enrichment services of between \$75 to \$100 per unit.

#### Contract Relief for Current ERDA Enrichment Customers

- . Present ERDA enrichment contracts require customers to commit to a fixed delivery schedule and to make pre-payments amounting to \$3 million several years prior to the first delivery of enriched fuel. Since these contracts were signed, many nuclear power plants whose fuel was covered by these contracts have been slipped or cancelled.
- . As a result of this slippage, utilities now face the prospect of having to pay for uranium enrichment services well in advance of the revised completion dates for the reactors.
- . In order to free both ERDA and the enrichment customers from unrealistic commitments, ERDA, with the concurrence of the Joint Committee on Atomic Energy (JCAE), intends to announce that it will:
  - Grant customers the right within a 60-day period to serve notice that they wish to terminate their contract in whole with no cancellation fee and with refund of any payments.
  - Permit for those not wishing to terminate in whole a one-time adjustment of contract commitments, without cost of charges for partial termination.
  - Permit a similar one-time adjustment of the rate at which uranium feed should be sent to the enriching plants to coincide in part with the slipped enrichment requirements.
- . These actions would:
  - Achieve a larger U.S. stockpile of enriched uranium to be used as an inventory which would support the new private uranium enrichment plants with backup



enriched material, should any delays occur in their operation.

- Establish a more realistic data base for evaluating future domestic and foreign enrichment requirements.
- Grant short-term financial relief to the utility industry.

SUMMARY OF THE URANIUM ENRICHMENT  
ASSOCIATES (UEA) PLAN AND PROPOSAL TO ERDA FOR  
A COOPERATIVE ARRANGEMENT

Physical Description of the Project.

- . A 9 million separative work unit per year gaseous diffusion plant would be built near Dothan, Alabama on a 1720 acre site on the Chattahoochee River.
- . When in full operation the plant could provide enriching services for about 90 large nuclear power reactors.
- . The plant will require about 2500 megawatts of electrical power which will be supplied from a dedicated nuclear power facility located nearby.
- . Project cost estimate (exclusive of the power project) has been estimated by UEA to be \$3.5 billion in 1976 dollars.
- . UEA projects continuation of design work now underway on the project during the next several years with construction scheduled to commence in 1977.
- . Full production from the plant is projected in 1983 with limited production starting in 1981.
- . Nearly 50 million construction manhours are estimated for the project. A peak construction labor force of about 7000 workers will be reached in 1979-80 and the permanent operating staff of the project is expected to be about 1100.
- . The plant will be processing and upgrading natural uranium and thus will have essentially no radiation hazard. It will be similar to a large chemical and materials handling plant except that the product material will be much more valuable.

Financial Structure of UEA Project.

- . UEA expects that two to six companies in addition to Bechtel and Goodyear will comprise the consortium that will undertake the project. These companies are expected to be identified within the next few months.

- . Based upon marketing efforts to date, UEA projects about 40 percent of plant capacity will be taken by U.S. domestic utilities and the balance by non-U.S. organizations in countries with which the United States has Agreements for Cooperation permitting the transfer or disposition of enriched uranium. (Under the Atomic Energy Act voting control for such a project must remain in the hands of the United States investors at all times and the project is so structured. The secrecy of the process will be protected and foreign customers or investors will not have access to classified technology or information.)
- . Project financing using an 85 percent debt, 15 percent equity ration is contemplated for the project.
- . The equity corresponding to the domestic portion of plant output will be supplied by UEA and the debt financing will be raised in the commercial market primarily on the basis of the security of long-term (25 year) non-cancelable enrichment service contracts with domestic utilities.
- . Both equity and debt for the foreign share of plant output must be supplied from the foreign customers' own sources of capital.
- . Pricing of product from the plant is based upon the recovery of all operating costs, servicing of debt and an after-tax return of approximately 15 percent on equity.
- . A 3 percent royalty on gross sales would accrue to the Government for use of taxpayer-developed technology.

#### Customers.

- . A number of United States' utilities have executed contingent letters of intent with UEA to purchase uranium enriching services from the new plant and a number of additional utilities are now evaluating their requirement for services.
- . UEA has made extensive marketing contacts overseas and anticipates that foreign commitments will be forthcoming from Iran, Japan, West Germany, France, Spain, Taiwan and other countries.

Cooperative Arrangements.

- . Due to the unique nature of the project, the very large capital requirements, and long payout periods, UEA has concluded that it would not be possible to move ahead without certain forms of Government backup assistance.
- . UEA has proposed that the Government:
  - Supply, at cost, essential components presently produced exclusively by the Government.
  - Supply the Government's gaseous diffusion technology and warrant its satisfactory operation.
  - Provide during first years of operation limited access to and from USG's stockpile of enriched material to balance significant start-up loading problems.
- . UEA has also proposed that:
  - The Government provide standby financial backup assistance lasting for the critical construction period plus one year to offset the current weak credit position of the U.S. utility industry and the Government to provide such financial backup if UEA cannot complete the plant or bring it into commercial operation, but such a call is at the risk of loss to UEA of its equity interest. In this event, the Government has the right to acquire UEA's domestic equity position and the obligation to assume UEA's liabilities and debt.
  - The Government may also require UEA to release the project to the Government if the Government's interest so demands. In this event, the Government would be obligated to assume UEA's liabilities and debt.
  - The consideration for acquisition of UEA's domestic equity position in either case can range from loss of equity for uncorrected gross mismanagement of UEA to full fair compensation for causative events outside UEA's reasonable control.
- . All of the above forms of backup assistance would be subject to detailed contract negotiations and would require extensive Government rights and responsibilities with respect to the character of the project design and construction. Though certain contingent forms of Government financial support to the project could be required, UEA believes that this is unlikely and that the project can be completed within the private sector. Under these conditions there would be no net expenditure of Government funds.

## Uranium Enrichment as Part of the Nuclear Fuel Cycle

The attached chart depicts the nuclear fuel cycle for Light Water Reactors, (the type of reactors mostly commonly used in the U.S.). About 97% of the reactors obtaining enrichment services from the ERDA gaseous diffusion plants are Light Water Reactors; a similar fuel cycle exists for the other present reactor type -- the High Temperature Gas Cooled Reactor.

Prior to the enrichment step, uranium is mined from the earth's crust and sent to a mill where uranium concentrate is produced. This concentrate is often referred to as yellowcake, or by its chemical symbol,  $U_3O_8$ . There are 14 mills presently operating in the U.S. The uranium concentrate is then sent to a converter where it is converted to uranium hexafluoride, or  $UF_6$ . This is the only simple form of uranium that can be gaseous at conditions near room temperatures and pressures. There are two  $UF_6$  conversion plants operating in the U.S.

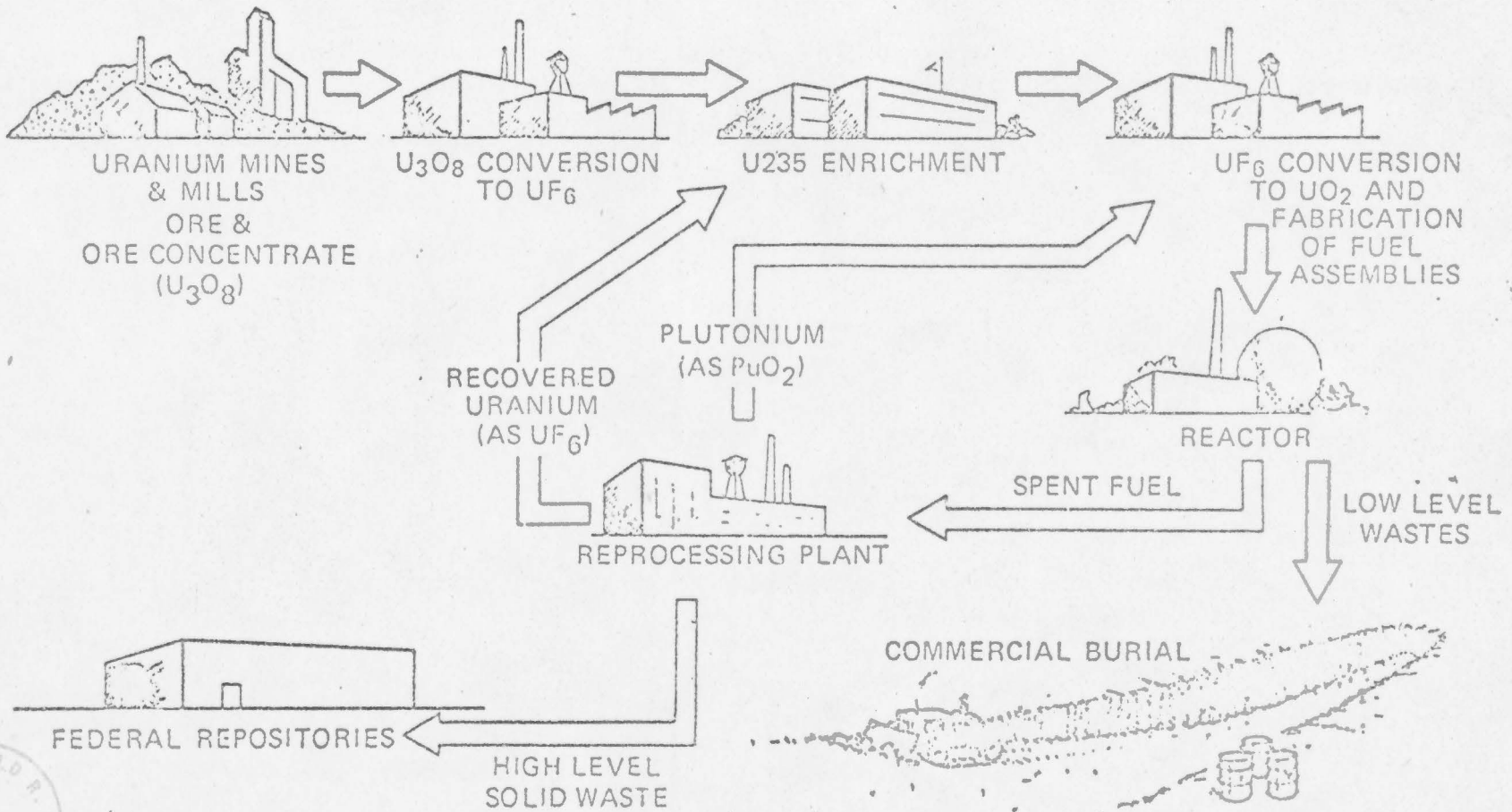
The uranium hexafluoride is then sent to an uranium enrichment plant. There are two processes under consideration for commercial use in the U.S. -- the established gaseous diffusion process, used in the ERDA plants, and the newer gas centrifuge process. The UEA will use the gaseous diffusion process. In the process, the uranium hexafluoride gas is pumped through a semipermeable membrane. The desirable fissionable isotope, U-235, diffuses through the membrane more readily than the nonfissionable isotope, U-238. A stream depleted in U-235 is collected from the plant and sent to storage. A stream enriched in U-235 is collected from the plant and sent to a fuel fabrication plant. In this plant, the uranium is converted to pellets of uranium dioxide,  $UO_2$ , and placed in zirconium tubes. The tubes are assembled into bundles and sent to nuclear power plants. Seven U.S. companies are involved in the fabrication of nuclear fuel.

After the fuel is used in the nuclear power plant, it is discharged and allowed to cool in a large water basin at the plant. The spent fuel will then be sent to a chemical reprocessing plant. In this step, the uranium and reactor-produced plutonium will be separated from the highly radioactive products generated while the fuel is in the

nuclear power plant. The radioactive wastes in proper form will be sent to a repository. The recovered uranium will be converted again to the hexafluoride and reinserted into the enrichment plants for reenrichment. Plutonium is also a fissionable material that can be used as fuel in a nuclear power plant. If use of the plutonium is granted by the Nuclear Regulatory Commission, it would be sent to the fuel fabrication plants; there it would be mixed with the uranium and formed into pellets for nuclear power plant fuel. There are currently no commercial chemical reprocessing plants operating in the U.S; one plant is shut down for modification and another is under construction.

Nuclear power plants require nearly a fixed amount of fissionable material in order to operate. If the capacity of an uranium enrichment plant is completely utilized under a set of operating conditions, and more power plants and thus more fuel is needed, more uranium could be mined, milled, converted, and pumped through the enrichment plant. However, if the necessary uranium could not be found in the earth's crust, additional uranium enrichment capacity would need to be built. Similarly, if nuclear power plants had planned on using plutonium to satisfy part of their fuel needs and it was not possible to use the plutonium, additional enriched uranium fuel would have to be obtained. This fuel could be obtained by mining, milling, converting, and pumping more uranium through an enrichment plant. Or, as above, if the necessary uranium could not be found, additional uranium capacity could be built.

THE NUCLEAR FUEL CYCLE  
FOR LIGHT WATER REACTORS



## URANIUM ENRICHMENT

### QUESTIONS AND ANSWERS

1. Why Privatization?
2. Why Privatization Now?
3. Why Government Assistance?
4. Cut Off Date?
5. Did the President Overrule Kissinger and Seaman?
6. Unanswered Safety and Environmental Questions
7. NRC Safeguards and Safety Controls
8. Foreign Investment Without Foreign Control
9. Foreign Customer Conditional Contracts with ERDA
10. U.S. Share of the Free World Market
11. Payments by Industry for Government-owned Technology
12. What Happens if a Private Plant Isn't Licensed?
13. What Happens if a Private Plant Doesn't Work?
14. Does UEA have Customers?





Q 1A's



## WHY PRIVATIZATION?

### Question:

ERDA (and AEC before it) is doing a good job of supplying uranium enrichment services. Why not simply continue the present arrangements and build new Government facilities rather than set up a complicated new arrangement?

### Answer:

First, the provision of uranium enrichment services is now essentially a commercial/industrial activity, not inherently a Government type of activity. There are many activities which only the Government can properly perform, but uranium enrichment is not one of them. We should not continue to expand these Governmental responsibilities within our economic system when private industry is able and willing, under appropriate Government licensing, to provide the service. Indeed, the Atomic Energy Act, which is also applicable to ERDA, declares in its statement of policy in Section 1 that

"The development, use and control of atomic energy shall be directed to ...strengthen free competition in private enterprise."

Second, involving major U.S. firms and based on competition, should display the initiatives which will best meet national goals in terms of assuring innovation, continued growth of the industry to meet domestic needs, and maintaining a dominant position for the U.S. in international supply. Also, the private venture will generate substantial revenues to the Treasury through payment of Federal income taxes and royalties for Government-owned technology.

Third, within the next 15-20 years, the U.S. must quadruple its present enrichment capacity. The new capacity could cost well over \$30 billion in capital costs alone. This is without any allowance for inflation (which could raise the cost to \$45-60 billion by the end of the period). Even though these costs would be recovered over a period of 30 years, this is an avoidable financial burden which the Government should not be expected to bear when private industry is willing to assume the responsibility.



## WHY PRIVATIZATION NOW?

### Question:

Private involvement seems like a good idea in the longer term, but why not build another Government plant now and bring private industry in for subsequent increments of capacity when the new gas centrifuge technology is ready for use?

### Answer:

There are several reasons for moving to private entry immediately:

First, private enterprise has already demonstrated its capability to do the job in that the present Government plants were build and are operated by private companies under contract to the Government.

Second, a substantial preparatory effort, funded by private industry, to undertake the job of constructing the next increments of U.S. capacity has been underway for the last several years.

--The UEA venture, based on the diffusion technology, is the first of these to reach the stage of industrial commitment to construction and contracting. UEA has lined up numerous potential customers, both foreign and domestic, and it has made detailed plans to proceed, including options on land and electric power.

--Additional private efforts based on the newer centrifuge technology are being put together by other private companies in concert with interested U.S. utility companies. Substantial momentum has been generated and it is time to get started in order to realize the benefits of this industrial initiative.

Third, the above private activities and financial investments were the result of an invitation to industry at large issued by the Executive Branch, beginning in 1971 and reemphasized in 1973. If the Government does not move now to support the first outcome of this present round of activity, it is likely that future private ventures called for by the Government in the energy field



will be substantially discouraged. The UEA venture will not only fulfill immediate needs but will also serve to "break trail" for subsequent ventures using a less proven technology.

Fourth, support by the Government of subsequent private increments of centrifuge capacity is an essential and integral part of the Administration's plan. When responses to the current Request for Proposals are received on the centrifuge approach in \_\_\_\_\_ it is expected that a number of such projects would also be selected to proceed, essentially in parallel to UEA. Approval of the UEA approach will, however, provide firm assurance now of future U.S. capacity involving the minimum degree of technological risk and allowing firm contracting with domestic and foreign customers to proceed promptly.



## WHY GOVERNMENT ASSISTANCE?

### Question:

Why should it be necessary for the Government to provide any assistance to get private industry to get involved in uranium enrichment? Why not just "unleash" industry and let them move ahead?

### Answer:

Despite many years of successful operation of Government-owned plants, uranium enrichment has no commercial private-sector history. Many process details must remain classified. Under these present conditions, commercial lenders are unwilling to consider risking the large amounts required for this capital-intensive activity, without credible assurances that the plant will perform.

First, the technology is owned by the Government and a substantial royalty will be paid for its use by the private sector. It is reasonable that the Government should warrant that the technology will work and be prepared to back this warranty up with assistance in the unlikely event that problems are encountered.

Second, the Government would actually supply, on a cost recovery basis for the UEA venture (and may be asked to supply for the expected centrifuge ventures) key pieces of classified equipment upon which the plant performance depends.

Third, foreign governments and domestic and foreign appropriate Government measures are needed to assure electric utility customers that their orders for nuclear fuels will be filled. This in turn is essential to meeting the growing domestic demand for electricity, a substantial part of which must be met from nuclear power if we are to reduce our dependence on foreign oil, and to assuring that the U.S. maintains its leadership role in the supply of enrichment services abroad in the rapidly growing international market.

Fourth, the only present source of back up supplies of enriched uranium large enough to back-stop the initial period of operation of new plants is the existing Government stockpile of this material, produced in the existing Government plants, and in part accumulated to serve exactly this type of contingency support purpose.



CUT OFF-DATE?

Question:

Is there a specified "cut-off" date when, if the UEA project seemed to falter, the Government would decide to seek authorization and appropriations for an add-on diffusion plant at Portsmouth?

Answer:

First, the risk of UEA failure is considered very small. Second, there is no one specified, pre-set date for such a decision. The approach that has been selected by the President calls for a major commitment to assure privatization of the next increment of capacity, and the full efforts of the Executive Branch will be devoted to assure the success of the approach.

The approach contemplates very close monitoring by the Government at all stages to assure that the Government could step in if the privatization effort threatened to fail -- an event that is considered very unlikely. This close monitoring will prevent any significant loss of time, if something were to go wrong, and thus assure that additional capacity can be brought on line by the time it is needed in the 1983-84 time period.

If the Government had to step in, the question of the plant that would be built (5 million unit add-on plant, or a 9 million unit free-standing plant) would depend on when intervention proved necessary. Some examples will illustrate the point:

If Congress failed to pass the authorizing legislation needed for the private enrichment industry approach and instead, passed authorization and appropriations for a Government plant, it probably would be desirable to proceed with the add-on plant approach.

UEA will be proceeding with all necessary arrangements for its planned plant (including design, power supply, etc.) while the Congress acts on the President's proposal. If at some time prior to March 1976 when UEA



is expected to complete financial, customer and power supply arrangements, UEA found that it could not proceed, the Government would need to determine whether it would be best to proceed with a 5 million unit add-on plant or with the 9-million unit free-standing plant.

If at some later time, UEA finds its way blocked or the Government finds it necessary to step in and assume UEA assets and liabilities, the Government would have to decide the best step. At some point it be more advantageous for the Government to proceed with the free-standing plant than to revert to an add-on plant.



DID THE PRESIDENT OVERRULE KISSINGER AND SEAMANS?

Question:

Was ERDA overruled on its proposal to build an add-on gaseous diffusion plant? Was Kissinger also opposed to the UEA proposal?

Answer:

The views of all key participants were considered by the President. There were no disagreements as to the desirability of supporting the development of a private U.S. enrichment industry, a concensus that this could be done with imperiling considerations of national security, safeguards or safety, or with the basic reasonableness of the UEA proposal. Some of the key judgmental questions which were considered related to the degree of assurance that the project would be completed successfully, that potential customers and the Congress would be satisfied as to the viability of the project, and that, as a result, the U.S. would be able to resume contracting for firm supply of enrichment services on a timely basis.

Following a thorough review of these and other matters, the benefits of early private sector involvement and in the establishment of an industry, together with the steps taken to reduce risks and increase assurances, made the present approach appear as the most desirable course of action.





UNANSWERED SAFETY AND ENVIRONMENTAL QUESTIONS

Question:

Why is the Ford Administration supporting the development of nuclear power in this country and abroad by making the supply of nuclear fuel readily available when there are still significant unanswered questions regarding the safety and environmental impact of nuclear power plants.

Answer:

All commercial nuclear power plants in this country are licensed by the Nuclear Regulatory Commission (NRC) after a full review, including the opportunity for public participation, of safety and environmental questions. While there continue to be issues requiring a greater degree of resolution, the NRC applies conservative criteria to ensure safe performance. The resulting safety record of commercial nuclear power plants has been excellent. There has been no member of the public killed or injured by any accident or occurrence at a nuclear power plant in this country. For this reason and because the overwhelming majority of technical experts in the field are satisfied with the level of safety of these plants we conclude that nuclear power plants are adequately safe. However, we are pursuing every opportunity to improve even further the safety of these power plants. Our safety research programs will spend over \$80 Million in FY 1976 in the Nuclear Regulatory Commission. Within ERDA our expenditures aimed at assuring environmentally sound fuel waste disposal amounts to \$36 million in FY 1976.



NRC SAFEGUARDS AND SAFETY CONTROLS

Question:

What types of domestic safeguards and safety controls will NRC apply to the UEA and private centrifuge ventures?

Answer:

NRC is expected to require essentially the same types of safeguards and safety procedures as are now successfully employed in Government-owned facilities. In the case of the UEA plant, safeguards problems will not be as severe as in Government plants since the UEA plant will be incapable of producing highly enriched U-235. Safety problems, in a nuclear radiation sense, are minimal.



FOREIGN INVESTMENT WITHOUT FOREIGN CONTROL

Question:

You have indicated that there will be substantial foreign investment in the proposed project -- including investment from OPEC nations. What safeguards do we have to protect us against potential abuses of foreign investors?

Answer:

Let me first address the general issue of the desirability of foreign investment in this type of project. As you know, one of the reasons why private industry has not moved forward faster in the uranium enrichment field has been its inability to obtain needed capital. Substantial foreign participation would not only help ease this problem but would provide an excellent example of international cooperation in developing alternative energy sources. Furthermore, to the extent that funds from OPEC countries are involved, this is precisely the type of constructive use of OPEC money that we would like to encourage.

As a target, the UEA plan contemplates 60% foreign investment, and centrifuge ventures could also involve foreign contributions. These foreign investments result in access, as customers, to an equivalent degree of the product output of the plant. The product is made available under Government Agreements for Cooperation and Government export licenses are required. The investments do not result in access to the classified U.S. technology or in a majority voting right in project management.

With respect to avoiding any potential for abuse resulting from foreign control or dominance, this is required by U.S. law and will be a necessary condition of being able to obtain a license from the Nuclear Regulatory Commission. Foreign participation in the UEA project is designed to assure both that no single foreign investor will have a dominant voice in the project, and also that no group of foreign investors, voting as a bloc, can impose their views on U.S. investors, voting as a bloc.



FOREIGN CUSTOMER CONDITIONAL CONTRACTS WITH ERDA

Question:

What happens to these foreign customers who have contracts with ERDA that are conditional on plutonium recycle and will therefore be terminated on June 30?

Answer:

Holders of such contracts have a Presidential assurance that they will be able to obtain their fuel needs from a U.S. source of supply. The existence of a viable UEA project will afford this opportunity. Indeed, a number of countries currently holding conditional contracts are already prospective investors in UEA.



U.S. SHARE OF THE FREE WORLD MARKET

Question:

How much of the foreign enrichment market might the U.S. expect to capture?

Answer:

The informal objective set by planning within the U.S. Government is to retain in the long term approximately 50% of the Free World market for uranium enrichment services.



PAYMENTS BY INDUSTRY FOR GOVERNMENT-OWNED TECHNOLOGY

Question:

Given the heavy investments made by the U.S. taxpayers in the U.S. enrichment program, what compensation is the Government likely to receive for the technology?

Answer:

It is expected that, as a royalty, the U.S. Government will charge 3% of the gross revenues of private producers for the use of its diffusion and centrifuge technologies. For example, should UEA generate gross revenues of one billion dollars per year, the Government would receive royalties of about \$30 million per year. Such a level would, of course, be increased as the centrifuge plants came into being. The Government would also collect taxes and license fees from the private operations.



WHAT HAPPENS IF A PRIVATE PLANT ISN'T LICENSED?

Question:

What happens if the plant isn't licensed?

Answer:

There is little reason to believe that the plant would not be licensed. From a health safety and environmental standpoint the project is expected to be much simpler to license than a nuclear power reactor. Licensability of the project will, however, be a key consideration from the outset and should any difficulties appear they will be recognized early. Under proposed terms the Government would take over the project if a license were not granted.



WHAT HAPPENS IF A PRIVATE PLANT DOESN'T WORK?

Question:

What happens if the plant doesn't work?

Answer:

The plant will use a process that has been proven and perfected over a quarter century of large scale Government operation. Governmental specialists will be involved in the details of the project and the Government will supply key components. The project will work.





DOES UEA HAVE CUSTOMERS?

Question:

Does the project have all the customers it needs to go forward?

Answer:

Letters of intent from domestic utilities cover about 15% of plant output. Several foreign governments have expressed reasonably firm interest in significant amounts of plant output. As the project is accepted as the next United States enriching plant, assuming that the requested authorizing legislation is approved, it is believed that customers will full subscribe to the available plant output.



June 26, 1975

Office of the White House Press Secretary

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THE WHITE HOUSE

FACT SHEET

THE PRESIDENT'S PLAN FOR A  
COMPETITIVE NUCLEAR FUEL INDUSTRY

	<u>Page</u>
The President's Announcement .....	3
Background .....	3
Plan Announced by the President .....	4
- Objectives	
- Principal Elements of the Plan	
. Legislative Authority for Cooperative Arrangements with Private Firms	
. Assurances for Customers	
. Controls and Safeguards	
. Preventing the Diversion of Nuclear Materials and spread of sensitive technology	
. Foreign Investment	
. Environmental Impact, Safety and Anti-Trust	
Implementing Actions .....	7
- Negotiations for a Diffusion Plant	
- Request for Proposal for Centrifuge Plants	
- Environmental Impact Statement	
- Contingency Planning	
- Diffusion Plant Design Work	
Specifics of the Legislative Proposal .....	8
- Authorizing Legislation	
. Cooperative Agreements	
. Congressional Review	
- Appropriations Request	
Developments Leading to the President's Plan .....	9
- U.S. Leadership in Uranium Enrichment Technology	
. Gaseous Diffusion	

more

(OVER)

- . Gas Centrifuge
- . Laser Separation
- Existing U.S. Capacity
- The Growing Market
- Potential Foreign Suppliers
- The Program to Develop a Competitive Industry
  - . Diffusion Plant
  - . Centrifuge Plant
- Obstacles to the Entry of Private Industry
- Alternatives to Private Entry
- The Proposal from Uranium Enrichment Associates (UEA)
- Centrifuge Enriching Projects - Request for Proposals

Other Actions Related to Uranium Enrichment

- Capacity ..... 13
- Increasing ERDA's Charge for Uranium Enrichment Services
  - Contract Relief for Current ERDA Enrichment Customers
  - ERDA Conditional Contracts for Enrichment Services

Attachment:

- #1 - Summary of UEA Plan and Proposal to ERDA 16
- #2 - Uranium Enrichment as a Part of the Nuclear Fuel Cycle 20

more

THE PRESIDENT'S ANNOUNCEMENT

The President today announced administrative actions and a legislative proposal to (a) increase the United States' capacity to produce enriched uranium in order to meet the needs of domestic and foreign nuclear power plants, (b) retain U.S. leadership as a world supplier of uranium enrichment services and nuclear power plants, (c) assure the creation, under appropriate controls of a private, competitive uranium enrichment industry in the U.S. -- ending the current Government monopoly; and (d) accomplish these objectives with little or no cost to taxpayers and with all necessary controls and safeguards.

BACKGROUND

- . Natural uranium from U.S. and foreign mines must be refined or "enriched" before it can be used to make fuel for nuclear power plants which are used in the United States and in many foreign nations to generate electricity.
- . U.S. capacity for enriching uranium which now supplies all domestic and most foreign needs, consists of three Government-owned plants, located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio.
- . Since mid-1974, the entire capacity of the three plants has been fully committed under long-term contracts. New enrichment capacity must be on "on-line" beginning in about 1983 to meet the growing domestic and foreign demand for nuclear fuel.
- . The potential U.S. market abroad has begun to erode as some potential foreign customers have started looking to sources such as the U.S.S.R., France and a West European consortium for uranium enrichment.
- . Since 1971, the Executive Branch has followed policies and programs directed toward assuring that private industry -- rather than the Federal Government -- builds the next increments of U.S. uranium enrichment capacity.

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- Several industrial firms have sought to enter the uranium enrichment field but all have found that some forms of Government cooperation and temporary assurances are needed to overcome the initial obstacles to private industry involvement.

## THE PLAN

Objectives. The plan announced by the President is designed to meet the objectives of assuring that:

- The next increments of U.S. uranium enrichment capacity will be available when needed to meet the growing demand for fuel for nuclear powered generating plants in the U.S. and in other nations.
- The U.S. maintains its leadership role in enrichment technology and its role as a major world supplier of uranium enrichment services and nuclear power plants -- a role that is important to:
  - Our economy and our world trade position.
  - Our efforts to obtain the commitment of additional nations to accept international safeguards and the principle of nuclear non-proliferation.
  - Our cooperation with other major oil consuming nations which are looking to nuclear power to help reduce their dependence on foreign oil imports.
  - Our longer range goal of developing technology and energy resources to supply a significant share of the free world's energy needs.
- All future increments of capacity will be built, financed and operated by private industry -- rather than by the Federal Government -- so that a competitive industry will exist at the earliest possible date.
- There will be little or no cost to the taxpayer and that the Government will receive increased revenue in corporate taxes and compensation for the use of its inventions and discoveries.
- All necessary domestic and international controls over nuclear materials and classified technology will be maintained, as they would be if the Government were to own the new plants.

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Principal Elements of the Plan.

Legislative Authority for Cooperative Arrangements with Private Firms. The President is asking the Congress to enact promptly the Nuclear Fuel Assurance Act to provide the additional legislative authority needed to enable the Energy Research and Development Administration (ERDA) to negotiate and enter into cooperative arrangements with private industrial organizations that wish to build, own and operate uranium enrichment plants.

- Negotiations would be directed toward the arrangements most advantageous to the Government and the public interest and with a degree of risk to the private firm that is consistent with the objective of creating a private, competitive uranium enrichment industry.
- These arrangements would provide for certain forms of Government cooperation and temporary assurances found to be necessary after detailed negotiations with firms submitting proposals. Arrangements could include:
  - . Supplying and warranting Government-owned inventions and discoveries in enrichment technology -- for which the Government will be paid.
  - . Selling certain materials and supplies on a full cost recovery basis which are available only from the Federal Government.
  - . Buying enriching services from private producers or selling enriching services to producers from the Government stockpile to accommodate plant start-up and loading problems.
  - . Assuring the delivery of uranium enrichment services to customers which have placed orders with private enrichment firms.
  - . Assuming the assets and liabilities (including debt) of a private uranium enrichment project if the venture threatened to fail -- at the call of the private venture or the Government, and with compensation to domestic investors in the private ventures ranging from full reimbursement to total loss of equity interest, depending upon the circumstances leading to the threat of failure.

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- The arrangements would be spelled out in a detailed contract, and the basis for arrangements would be subject to Congressional review.
- It is intended that any undertaking by the Government to acquire assets or interest and to assume liabilities of a private venture would end after approximately one full year of commercial operation of a plant. The precise period would be determined in the negotiation of definitive agreements.
- The Government would monitor progress carefully so that it can be sure that the plant will function properly and will be completed on time and within cost estimates.

Assurances for Customers. The President announced his pledge to domestic and foreign customers who place orders with private U.S. suppliers that the Government will assure that orders will be filled as services are needed. Those first in line with private suppliers will be first in line to receive services from the Government -- if it were necessary for the Government to take over and complete a private project.

Controls and Safeguards. The President announced that all necessary controls and safeguards will be maintained in all arrangements with private firms. Such controls and safeguards include:

- Preventing the Diversion of Nuclear Materials or Un-Controlled Spread of Sensitive Technology. All necessary measures will be taken to safeguard the use of the products of plants and to protect sensitive classified technology. These measures include:
  - . Effective domestic safeguards and physical security measures to the plants and their products.
  - . Continued requirements that exports take place pursuant to appropriate international agreements for cooperation and be subjected to safeguards to prevent diversions.

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- Continued classification and protection of sensitive enrichment technology.

Foreign Investment. Foreign investment in private enrichment ventures will be encouraged, but control will remain, as required by law, with U.S. interests. Foreign investors would not require or have access to classified information. Any proposals for sharing technology would be considered separately and would be subject to Governmental review and approval.

Environmental Impact, Safety and Anti-Trust. Private ventures wishing to build plants will have to obtain from the Nuclear Regulatory Commission (NRC) a construction permit and operating license. As a part of its review, the NRC must evaluate environmental, safety and anti-trust considerations as well as assure that control of the proposed new ventures remain in the U.S. -- as now required by the Atomic Energy Act. NRC also will have responsibility for assuring that the plants are appropriately safeguarded. The Justice Department participates in the review of anti-trust considerations.

### IMPLEMENTING ACTIONS

The President announced several administrative actions that are being taken now:

- Negotiations for a Diffusion Plant. ERDA is responding formally to a proposal from the Uranium Enrichment Associates (UEA) offering to enter into negotiations which could lead to the construction by UEA of a \$3.5 billion (1976 dollars) plant which would make use of gaseous diffusion technology and which would be on line by about 1983.
- Request for Proposal for Centrifuge Plants. ERDA is issuing today a new request for proposals from industrial firms interested in constructing, owning and operating enrichment facilities making use of centrifuge technology.
- Environmental Impact Statement. ERDA will on June 30 issue for public review and comment a draft environmental impact statement concerned with the expansion of uranium enrichment capacity to be attained through ERDA's implementation of this action.

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- . Contingency Planning. ERDA will continue with backup contingency measures to assure that capacity will be ready in the unlikely event that industrial efforts falter. These measures include continuation of Government conceptual design activities, research and development on enrichment technologies, and technological assistance to the private sector on a cost recovery basis.
- . Diffusion Plant Design Work. ERDA plans to purchase from UEA design work on components for the private diffusion plant that could be used in a Government plant -- if the private venture were unable to proceed.

#### SPECIFICS OF THE LEGISLATIVE PROPOSAL

Authorizing legislation. The basic enabling legislation proposed today by the President would:

- . Authorize Cooperative Agreements.
  - It would permit ERDA to negotiate and enter into cooperative arrangements with firms wishing to build, own and operate uranium enrichment facilities.
  - It would provide authorization for contract authority for amounts up to \$8 billion as may be approved in an appropriation act -- which is an estimate of the total potential cost to the Government in the unexpected event that all Government assured diffusion and centrifuge ventures were to fail, and it was then necessary for the Government to assume assets and liabilities of these ventures, take over plants, and compensate domestic investors. The Administration's expectation is that none of these funds would have to be appropriated or expended for the assumption of private ventures, but the authorization is necessary to provide assurance to customers and to potential producers of the Federal Government's commitment to create a competitive industry.
- . Provide for Congressional Review. Once contracts were negotiated the Joint Committee on Atomic Energy (JCAE) would be notified and a period of 45 days would have to elapse before a contract would be executed -- to allow an opportunity for Congressional review of the basis for ERDA's arrangements with private firms.

Appropriations Request. The President will later request an appropriation of contract authority which is required by the proposed bill before a contract can be executed, in order to cover the estimated maximum Federal Government exposure for specific projects in the event that it were necessary to assume assets and liabilities. Again, expenditure of these funds for assumption of any private venture is not considered likely.

#### DEVELOPMENTS LEADING TO THE PRESIDENT'S PLAN

U.S. Leadership in Uranium Enrichment Technology. The United States is the recognized world leader in technology for refining or "enriching" natural uranium to a form that can be used to make fuel for nuclear power reactors. Natural uranium contains only a small amount (approximately .7%) of the fissionable isotope U-235. In order to be useful to make fuel for most nuclear reactors, the concentration of U-235 must be increased to about 2-4% through a process of separating off other isotopes. The technology was developed and is owned by the Federal Government. Certain parts of the technology are classified. Principal U.S. technologies are:

- Gaseous Diffusion. This technology which is now used in the three existing government-owned enrichment plants was developed in the 1940's. Over 30 years of large scale operating experience and process improvement have made the technology the most reliable and economical now available for commercial scale operations. The next increment of capacity must make use of this technology.
- Gas centrifuge. The gas centrifuge process of uranium enrichment provides an alternative to gaseous diffusion. Full operation of a Government pilot plant is scheduled for early 1976. If the projected economics of the process are realized, gas centrifuge technology is expected to be used as subsequent increments of commercial capacity are added.
- Laser Separation. ERDA is conducting a basic research program to determine whether this technology is technically or commercially feasible. Even if successful, the technology will not be available in time to be used for the next several increments of needed enrichment capacity.

Existing U.S. Capacity. The three Government-owned uranium enrichment plants will, when currently authorized expansion is completed, have the capacity to produce enriched uranium needed to fuel about 300 large nuclear-powered electric generating plants in the U.S. and foreign countries.

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The Growing Market. Current estimates are that the U.S. will require for domestic needs added enrichment capacity by 2000 equal to 6 to 9 plants the size of any one of the three existing plants and that added capacity for the total market served by the U.S. will equal 9 to 12 similar size plants.

Potential Foreign Suppliers. The principal existing capacity for enriching uranium outside the U.S. is in the Soviet Union. A French-led diffusion plant project (Eurodif) is expected to begin production in 1979 and its capacity is reported to be fully committed. A British-German-Dutch consortium (Urenco) plant will also begin expanded operations in 1979. Plans for additional plants are being discussed by France, Canada, South Africa, Japan, Australia and Brazil.

The Program to Develop a Competitive Industry. The Atomic Energy Act of 1954 provides that "the development, use and control of atomic energy shall be directed so as to ... strengthen free competition in private enterprise". An Executive Branch policy to encourage private industry to build the next increments of uranium enrichment capacity was announced in June 1971. Beginning in 1973, the Atomic Energy Commission (AEC) asked private firms to consider building, owning and operating enrichment plants and granted qualified U.S. firms access to classified aspects of the Government's work, under carefully controlled security conditions, in order that they might make their own assessment of the commercial potential for private enriching plants. A number of firms responded to the invitation from which several consortia have emerged which are interested in pursuing the possibility of building enrichment plants.

- . Diffusion Plant. One consortium -- the Uranium Enrichment Associates (UEA) -- is interested in constructing a \$3.5 billion gaseous diffusion plant equivalent to the expanded capacity of one of the 3 existing Government-owned plants.
- . Centrifuge Plants. Other firms and consortia -- Centar, Exxon Nuclear and Garrett Corporation -- have expressed interest in cooperative arrangements with the Federal Government which would lead to demonstration gas centrifuge plants which could be expanded in the future to commercial scale plants. The AEC (predecessor to ERDA) requested proposals from industry to advance the demonstration of centrifuge technology. A modified request for proposals is being issued today by ERDA.

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Obstacles to the Entry of Private Industry. All firms interested in building, owning and operating a private plant have concluded that some form of Government cooperation and temporary assurances are essential to begin the transition to a private competitive industry. Among the factors that have contributed to this conclusion are:

- . The complexity of the undertaking, including the Federal ownership and the classification of the technology.
- . The large financial commitment required and the difficulty encountered in trying to obtain private financing.
- . The inherent difficulties of ending a Government monopoly.
- . The recent adverse financial situation of U.S. electrical utilities which are the customers for a plant. (Their long term contracts for uranium enrichment services must provide security for the long term financing required.)
- . Some uncertainty as to whether the Government would follow through on its commitment to achieve privatization.

Alternatives to Private Entry. The principal alternatives to an immediate effort to achieve privatization include:

- . All future additions to capacity financed, built and owned by the Federal Government, thus continuing indefinitely the existing monopoly.
- . Government financing and ownership of one or more additional increments of capacity, followed by another attempt to achieve privatization.

A thorough review indicated that, regardless of the alternative selected:

- . The next increment of capacity can be on line when needed (now estimated about 1983).
- . Controls and safeguards involving classified technology and non-proliferation of nuclear materials can be maintained.
- . Customers for the next increment are expected to be largely foreign.
- . Foreign investments in an enrichment plant can be accommodated.

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This review led to the conclusion that the task of explaining and implementing the plan for achieving a private industry would be difficult and that a substantial effort would be required by both the Congress and the Executive Branch, but that the benefits of privatization justified the effort. The benefits of privatization include:

- . Avoiding a cost to taxpayers of \$40 to \$50 billion for plants that should be on line by 2000, if the Federal Government were to finance and own the plants. (These funds would not be recovered to the Treasury for many years.) Under the President's plan, revenue of about \$90 to \$100 million per plant per year would flow to the Federal Treasury from industry, principally from taxes and payments for the use of Government inventions and discoveries.
- . An early end to the Government monopoly in a type of commercial activity.
- . Avoiding expansion of the public sector when industry is willing and able to do the job.
- . Competition which would provide incentives for lower costs and additional improvements in technology.

The Proposal from Uranium Enrichment Associates (UEA). Uranium Enrichment Associates is a consortium currently consisting of Bechtel Corporation and the Goodyear Tire and Rubber Company. On May 30, 1975, UEA submitted a revised proposal to ERDA calling for cooperative arrangements with the Federal Government. The principal features of the UEA proposals are summarized in Attachment #1. A contract containing the details of a cooperative agreement would be negotiated by UEA and ERDA.

#### Centrifuge Enriching Projects -- Request for Proposals.

- . In August of 1974 the Government announced a program expected to lead to several relatively small industry constructed demonstration projects.
- . Gas centrifuge technology has not yet been applied on a production scale sufficient to permit full industry commitment to large plants. At least three companies are interested in undertaking private centrifuge enriching projects now which would be scaled up progressively from small demonstration modules to a capacity the economies of scale for centrifuge enriching are expected to be largely realized. These are expected to be 1/3 to 1/2 the capacity of the planned diffusion plant.

- Government-industry cooperative arrangements similar to that required for the UEA diffusion project may be required.
- A Request for Proposals for this program which extends and elaborates upon the earlier program is being issued today:
  - Proposals will be due on October 1, 1975 and it is the Government expectation that several proposals could be accepted to proceed more or less in parallel with each other and with the UEA project.
  - Proposers will describe their proposed project in detail, including plant design, size, location and schedules and specify the type and magnitude of Government support necessary to proceed.
  - Small initial modules, perhaps 200-300 thousand units per year could be in operation in the early 1980's with 2-3 million unit commercial scale plants achieved in the mid-1980's on a time frame consistent with the growth of the market.
- Centrifuge technology permits adding small capacity increments as required to closely follow market needs.
- Proceeding with several centrifuge demonstration projects in the same time frame as the gaseous diffusion plant will further the objective of developing a private, competitive enriching industry and maintaining U.S. world leadership in this field.

#### OTHER ACTIONS RELATED TO URANIUM ENRICHMENT CAPACITY

##### Increasing ERDA's Charge for Uranium Enrichment Services.

- The current price charged by ERDA for uranium enrichment is based on a statutory formula which says that ERDA's charge must be established on the basis of the recovery of the Government's costs over a reasonable period of time. Application of the formula has resulted in a present charge of about \$42 to \$48 per separative work unit, depending on the type of contract a customer has with ERDA. This price will rise by the end of 1975 to about \$53 and \$60 per unit. These prices reflect the low cost of construction during the 1940's and 1950's for plants built primarily for military purposes. These prices are much lower than the quoted world market prices of enrichment services of between \$75 to \$100 per unit.

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The President announced in his 1976 Budget his intention to propose legislation to the Congress to permit ERDA to raise the price of enrichment services from its plants. The new price would be established to recover the Government's costs and place the pricing of Government enriching services on a more business-like basis. This step would encourage private sector interest in building enrichment facilities and end an unjustifiable subsidy to both foreign and domestic customers. The new price would include a rate of return on investment more appropriate to the private sector than the Government's rate of return, an allowance equivalent to corporate income taxes and also include other costs typical of private operations. On this basis the new price per separative work unit will be approximately \$76.

This legislation has been submitted to the Congress by ERDA.

Contract Relief for Current ERDA Enrichment Customers.

Present ERDA enrichment contracts require customers to commit to a fixed delivery schedule and to make prepayments amounting to about \$3 million per plant several years prior to the first delivery of enriched fuel. Since these contracts were signed, many nuclear power plants whose fuel was covered by these contracts have been postponed or cancelled.

As a result, many utilities now face the prospect of having to pay for uranium enrichment services well in advance of the revised completion dates for the reactors.

In order to free both ERDA and the enrichment customers from unrealistic commitment, ERDA, after notifying the Joint Committee on Atomic Energy (JCAE), has announced that it will:

- Grant customers the right within a 60-day period to serve notice that they wish to terminate their contract with no cancellation fee and with refund of any payments.
- Permit those wishing to defer deliveries (rather than terminate contracts) to have a one-time adjustment of contract commitments without penalty.
- Permit a similar one-time adjustment of the rate at which uranium feed should be sent to the enriching plants to coincide in part with the slipped enrichment requirements.

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These actions would:

- Result in a larger U.S. stockpile of enriched uranium for use as an inventory to support the new private uranium enrichment plants with backup supplies of enriched material, should any delays occur in their initial operation.
- Establish a more realistic data base for evaluating future domestic and foreign enrichment requirements.
- Grant needed short-term financial relief to the utility industry.

ERDA Conditional Contracts for Enrichment Services.

- . Some customers placing orders with AEC (predecessor to ERDA) in mid-1974 were given conditional contracts; i.e., contracts contingent upon the approval by U.S. regulatory authorities (now the Nuclear Regulatory Commission) of the use of recycled plutonium as a nuclear reactor fuel. These conditional contracts were backed up by announcement that the U.S. would have expanded capacity available that could fulfill requirements, if needed.
- . The expanded U.S. capacity that will result from the President's plan will provide sources of supply that can be tapped by the holders of conditional contracts.

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SUMMARY OF THE URANIUM ENRICHMENT  
ASSOCIATES (UEA) PLAN AND PROPOSAL TO ERDA FOR  
A COOPERATIVE ARRANGEMENT

Physical Description of the Project.

- . A 9 million separative work unit per year gaseous diffusion plant would be built near Dothan, Alabama on a 1720 acre site on the Chattahoochee River.
- . When in full operation the plant could provide enriching services for about 90 large nuclear power reactors.
- . The plant will require about 2500 megawatts of electrical power which will be supplied from a dedicated nuclear power facility located nearby.
- . Project cost estimate (exclusive of the power project) has been estimated by UEA to be \$3.5 billion in 1976 dollars.
- . UEA projects continuation of design work now underway on the project during the next several years with construction scheduled to commence in 1977.
- . Full production from the plant is projected in 1983 with limited production starting in 1981.
- . Nearly 50 million construction manhours are estimated for the project. A peak construction labor force of about 7000 workers will be reached in 1979-80 and the permanent operating staff of the project is expected to be about 1100.
- . The plant will be processing and upgrading natural uranium and thus will have essentially no radiation hazard. It will be similar to a large materials handling plant except that the product material will be much more valuable.

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### Financial Structure of UEA Project.

- . UEA expects that two to six companies in addition to Bechtel and Goodyear will comprise the consortium that will undertake the project. These companies are expected to be identified within the next few months.
- . Based upon marketing efforts to date, UEA projects that about 40 percent of plant capacity will be taken by U.S. domestic utilities and the balance by non-U.S. organizations in countries with which the United States has Agreements for Cooperation permitting the transfer or disposition of enriched uranium. (Under the Atomic Energy Act voting control for such a project must remain in the hands of the United States investors at all times and the project is so structured. The secrecy of the process will be protected and foreign customers or investors will not have access to classified technology or information.)
- . Project financing using an 85 percent debt, 15 percent equity ratio is contemplated for the project.
- . The equity corresponding to the domestic portion of plant output will be supplied by UEA and the debt financing will be raised in the commercial market primarily on the basis of the security of long-term (25 year) non-cancelable enrichment service contracts with domestic utilities.
- . Both equity and debt for the foreign share of plant output is to be supplied from the foreign customers' own sources of capital.
- . Pricing of product from the plant is based upon the recovery of all operating costs, servicing of debt and an after-tax return of approximately 15 percent on equity.
- . A 3 percent payment, based on gross sales would be paid to the Government for use of taxpayer-developed technology.

### Customers.

- . A number of United States' utilities have executed contingent letters of intent with UEA to purchase uranium enriching services from the new plant and a number of additional utilities are now evaluating their requirement for services.

- . UEA has made extensive marketing contacts overseas and anticipates that foreign orders will be forthcoming.

### Cooperative Arrangements.

- . Due to the unique nature of the project, the very large capital requirements, and long payout periods, UEA has concluded that it would not be possible to move ahead without certain forms of Government backup assistance.
- . UEA has proposed that the Government:
  - Supply, at cost, essential components presently produced exclusively by the Government.
  - Supply the Government's gaseous diffusion technology and warrant its satisfactory operation.
  - Buy enriching services from UEA or sell enriching services to UEA from the Government stockpile to accommodate plant start-up and loading problems.
- . UEA has also proposed that:
  - The Government provide standby financial backup assistance lasting for the critical construction period plus approximately one additional year to offset the current weak credit position of the U.S. utility industry. The Government provide financial backup if UEA cannot complete the plant or bring it into commercial operation. A call on this financial backup is made at the risk of loss to UEA of its equity interest. In this event, the Government has the right to acquire UEA's domestic equity position and the obligation to assume UEA's liabilities and debt.
  - The Government may also require UEA to release the project to the Government if the Government's interest so demands. In this event, the Government would be obligated to assume UEA's liabilities and debt.
  - The consideration for acquisition of UEA's domestic equity position in either case can range from loss of equity for uncorrected gross mismanagement of UEA to full fair compensation for causative events outside UEA's reasonable control.

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All of the above forms of backup assistance would be subject to contract negotiations between ERDA and UEA. UEA believes that the plant can be completed within the private sector with no net expenditure of Government funds.

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### Uranium Enrichment as Part of the Nuclear Fuel Cycle

The attached chart depicts the nuclear fuel cycle for Light Water Reactors, (the type of reactors most commonly used in the U.S.). About 97% of the reactors obtaining enrichment services from the ERDA gaseous diffusion plants are Light Water Reactors, a similar fuel cycle exists for the other present reactor type -- the High Temperature Gas Cooled Reactor.

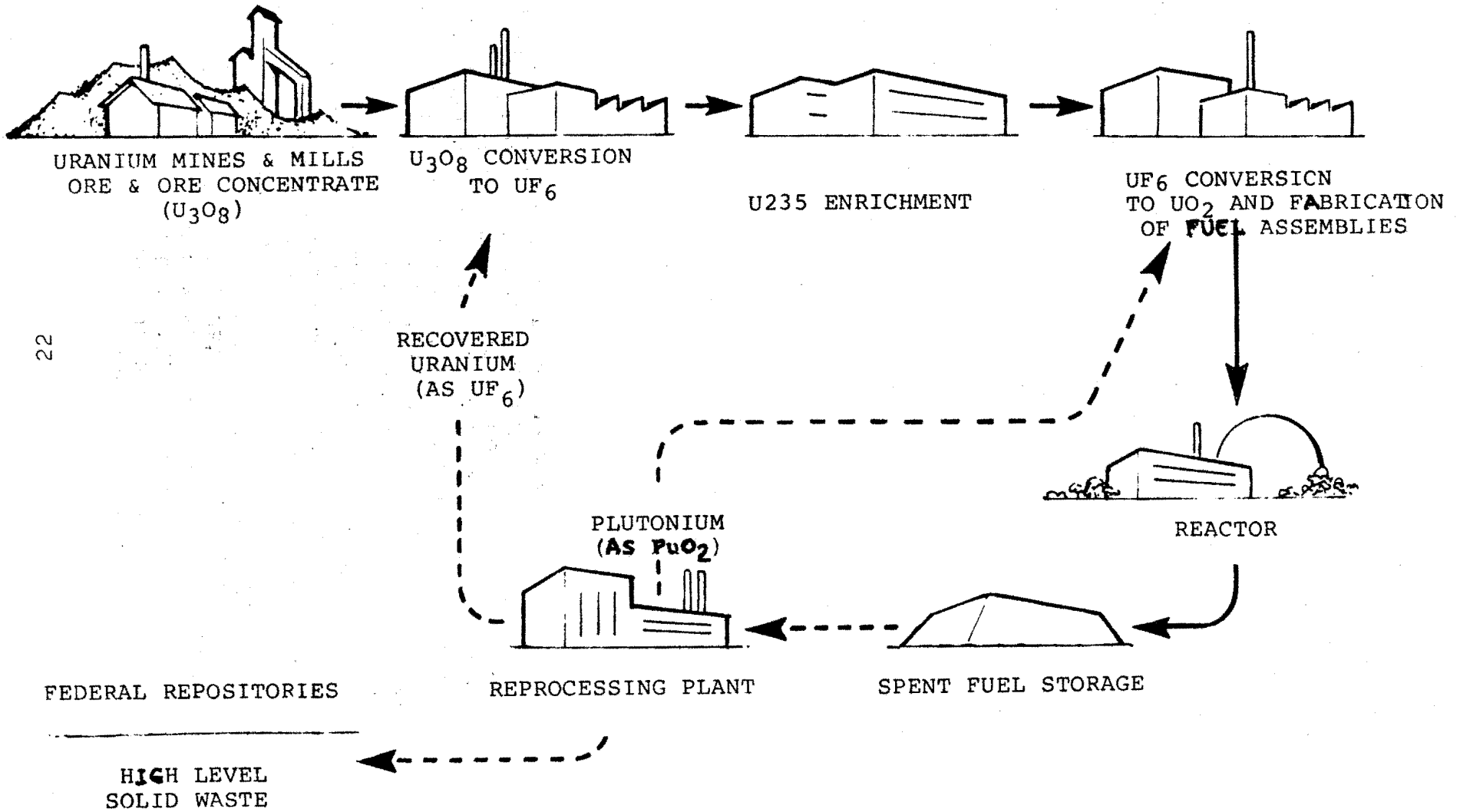
Prior to the enrichment step, uranium ore is mined from the earth's crust and sent to a mill where uranium concentrate is produced. This concentrate is often referred to as yellowcake, or by the chemical symbol,  $U_3O_8$ . There are 14 mills presently operating in the U.S. The uranium concentrate is then sent to a converter where it is converted to uranium hexafluoride, or  $UF_6$ . This is the only simple form of uranium that can be gaseous at conditions near room temperatures and pressures. There are two  $UF_6$  conversion plants operating in the U.S.

The uranium hexafluoride is then sent to a uranium enrichment plant. There are two processes under consideration for commercial use in the U.S. -- the established gaseous diffusion process, used in the ERDA plants, and the gas centrifuge process. The UEA will use the gaseous diffusion process. In the process, the uranium hexafluoride gas is pumped through a semipermeable membrane. The desirable fissionable isotope, U-235, diffuses through the membrane more readily than the nonfissionable isotope, U-238. A stream depleted in U-235 is collected from the plant and sent to storage. A stream enriched in U-235 is collected from the plant and sent to a fuel fabrication plant. In this plant, the uranium hexafluoride is converted to uranium dioxide  $UO_2$ , formed into pellets, and placed in zirconium tubes. The tubes are assembled into bundles and sent to nuclear power plants. Seven U.S. companies are involved in the fabrication of nuclear fuel.

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After the fuel is used in the nuclear power plant, it is discharged and allowed to cool in a large water basin at the plant. The spent fuel will then be sent to a chemical reprocessing plant. In this step, the uranium and reactor-produced plutonium will be separated from the highly radioactive fission products generated while the fuel is in the nuclear power plant. The radioactive wastes in proper form will be sent to a repository. The recovered uranium will be converted again to the hexafluoride and reinserted into the enrichment plants for reenrichment. Plutonium is also a fissionable material that can be used as fuel in a nuclear power plant. If use of the plutonium is granted by the Nuclear Regulatory Commission, it would be sent to the fuel fabrication plants; there it would be mixed with the uranium and formed into pellets for nuclear power plant fuel. There are currently no commercial chemical reprocessing plants operating in the U.S.; one plant is shut down for modification and another is under construction.

# The Light Water Reactor Nuclear Fuel Cycle



THE WHITE HOUSE

WASHINGTON

June 27, 1975

MEMORANDUM FOR:

BOB FRI  
JOHN HILL  
TENNEY JOHNSON  
MYRON KRATZER  
HUGH LOWETH  
JIM MITCHELL  
BARRY ROTH

FROM:

*Glenn Schleede*  
GLENN SCHLEEDE

SUBJECT:

URANIUM ENRICHMENT - FINAL  
VERSION OF THE Q&A's

We held up distribution of the Q&A's yesterday so that a few could be added. We must get them out Monday afternoon.

Would you please look over the attached package and let me know by noon Monday if any changes are needed.

The new Q&A's added are the following:

- 5 What work will continue on a possible Government-owned add-on diffusion plant?
- 10 Why no Board of Directors with Federal Membership?
- 14 Nuclear Materials Safeguards Implications
- 16 Why So much Emphasis on Uranium Enrichment Sales to Foreigners?
- 19 Investment Requirements Discriminate Against Foreign Customers?
- 22 Basis for the \$8 Billion Authorization Request?
- 23 Basic of Uranium Enrichment

Attachment

cc: Jim Connor  
Jim Cavanaugh  
Max Friedersdorf





QUESTIONS AND ANSWERS RELATING TO  
THE PRESIDENT'S PLAN FOR A COMPETITIVE  
URANIUM ENRICHMENT INDUSTRY

1. Why Privatization?
2. Why Privatization Now?
3. Why Government Assistance?
4. Cut-Off Date on Attempt to Get Private Entry?
5. What Work Will Continue on a Possible Government-Owned Add-on Diffusion Plant?
6. When Will the U.S. "Order Book" Open?
7. What Happens if a Private Plant Doesn't Work?
8. What Happens if a Private Plant Isn't Licensed?
9. Does UEA Have Customers?
10. Why No Board of Directors With Federal Membership?
11. Payments by Industry for Government-Owned Technology?
12. Unanswered Safety and Environmental Questions?
13. NRC Safeguards and Safety Controls?
14. Nuclear Materials Safeguards Implications?
15. Will Classified Technology Now be More Widely Available to Private Industry?
16. Why So Much Emphasis on Uranium Enrichment Sales to Foreigners?
17. Foreign Investment Without Foreign Control?
18. Foreign Purchases Without Investment?
19. Investment Requirements Discriminate Against Foreign Customers?
20. Foreign Customer Conditional Contracts with ERDA?
21. U.S. Share of the Foreign Market?
22. Basis for the \$8 Billion Authorization Request?
23. Basic of Uranium Enrichment?
  - What does "uranium enrichment" mean? What does it consist of?
  - Why is the process referred to as a "service"?
  - How does the gas centrifuge process differ from the gaseous diffusion process?
  - Why is the enrichment process secret or "classified"?
  - What is a Separative Work Unit (SWU)?

WHY PRIVATIZATION ?Question:

ERDA (and AEC before it) is doing a good job of supplying uranium enrichment services.. Why not simply continue the present arrangements and build new Government facilities rather than set up a complicated new arrangement?

Answer:

There are many important reasons for proceeding with the creation of competitive nuclear fuel supply industry. The principle reasons are:

- (1) The provision of uranium enrichment services is now essentially a commercial/industrial activity, not inherently a Government type of activity.
- (2) We should end the Government monopoly and not continue to expand Governmental responsibilities within our economic system when private industry is able and willing to provide the service.
- (3) Construction of uranium enrichment plants which provide a commercial service -- which could cost \$40 to \$50 billion in new capacity through 2000 - should not compete in the Federal Budget with other areas -- such as social services and defense preparedness -- which can only be financed by the Government.
- (4) Continuing to have enrichment under the direct Federal control would centralize to an unprecedented degree operating control by the Government over the Nation's electrical energy, as nuclear power grows. This would present an opportunity for abuse and is poor public policy.
- (5) Private investment will insure that supply meets demand through operation of the market mechanism.

- (6) Private operation will avoid the delays and uncertainties associated with the Government's budget and appropriations processes to finance new increments of capacity every year or two.
- (7) Private competition will provide incentives - over the long term - for lower costs, improved efficiencies, and technological advancement.
- (8) Private ventures will generate substantial revenues to the Treasury through payment of Federal income taxes and compensations for Government-owned discoveries and inventions used by industry.

6/24/75

WHY PRIVATIZATION NOW?Question:

Why not build another Government plant now and bring private industry in for subsequent increments of capacity when the new gas centrifuge technology is ready for use?

Answer:

There are several reasons for moving to private entry immediately:

- . In line with the private entry policy announced by the President in 1971, several industrial firms have undertaken substantial efforts to prepare for building, owning and operating plants to enrich uranium. This momentum would be lost if policy were reversed and another Government plant built.
- . One venture has reached the stage where it can propose construction of a plant and begin taking orders. It has lined up customers, and made detailed plans to proceed, including options on land and electrical power. This plant would use diffusion technology.
- . Other ventures have been organized and are making plans to propose demonstration plants using centrifuge technology to provide the next increments of capacity.

The diffusion plant venture will fulfill immediate needs for a commitment to new capacity, follow through on the Government's commitment to private entry into uranium enrichment, and serve to "break trail" for subsequent ventures using the less proven centrifuge technology.

There are substantial benefits to moving ahead now with private entry and no convincing reasons for a delay. One of the benefits of private entry is being able to bring on new capacity with little or no cost to taxpayers. If we were to build another plant taxpayers would have to advance the money -- from the U.S. Treasury.

WHY GOVERNMENT ASSISTANCE?Question:

Why should it be necessary for the Government to provide any assistance to get private industry to get involved in uranium enrichment if it is really a commercial operation?

Answer:

The President's program contemplates Government cooperation and temporary assurances to overcome rather well defined obstacles to privatization:

- . Uranium enrichment, as a Government monopoly, has no commercial private-sector history. Many process details are and must remain classified. Under these conditions, commercial lenders are unwilling to consider risking the very large amounts required for this capital-intensive activity, without credible assurances that these early private plants will be completed and will become operational.
- . The technology is owned by the Government and a substantial compensation will be paid for its use by the private sector. It is reasonable for the Government to warrant that the technology will work and be prepared to back this warranty up in the unlikely event that problems are encountered.
- . The Government would supply, on a full cost recovery basis key pieces of classified equipment upon which the plant performance depends and which are available only from the Federal Government.
- . Since enriched uranium is essential to operating nuclear plants, Government measures are needed to assure electric utility customers, both foreign and domestic, that their orders for nuclear fuels will be filled. This in turn is essential to meeting the growing domestic demand for electricity, a substantial part of which must be met from nuclear power if oil consuming nations are to reduce their dependence on imported oil. Government assurance that orders will be filled is a logical part of the proposed program. This assurance is especially important to foreign customers and will help the U.S. maintain its leadership role in the supply of enrichment services abroad.

The only present source of back up supplies of enriched uranium large enough to back-stop the initial period of operation of new plants is the existing Government stockpile of this material and the Government can provide such back-stopping.

This assistance is a firm indication of the Government's commitment, and is necessary in order to assure private industry that the Government truly wants them to undertake the large capital expenditures that will be required in the next few years.

CUT-OFF DATE ON ATTEMPT TO GET PRIVATE ENTRY?Question:

Is there a specified "cut-off" date when, if the UEA project seemed to falter, the Government would decide to proceed with an add-on diffusion plant?

Answer:

First, the risk of UEA failure is considered very small.

Second, there is no single specified, pre-set date for such a decision.

The approach to privatization selected by the President calls for very close monitoring by the Government at every stage to assure that the Government could step in if the private effort threatened to fail -- an event considered very unlikely. This close monitoring will prevent any significant loss of time, if something were to go wrong, and thus assure that additional capacity can be brought on line by the time it is needed, around 1983.

If the Government had to step in, the question of the plant that would be built -- that is, a 5 million unit add-on plant, or a 9 million unit free-standing plant -- would depend on when intervention proved necessary. For example:

If Congress failed to pass the authorizing legislation needed for the private enrichment industry approach and instead, passed authorization and appropriations for a Government plant, it probably would be desirable to proceed with the add-on plant approach.

If at some time prior to March 1976 when UEA is expected to complete financial, customer and power supply arrangements, UEA found that it could not proceed, the Government would need to determine whether it would be best to proceed with an add-on plant or with the planned 9-million unit free-standing plant.

If at some later time, the Government has to step in and assume UEA assets and liabilities, the Government would have to decide the best step. At some point it would be more advantageous for the Government to proceed with the free-standing plant than an add-on.

6/24/75

WHAT WORK WILL CONTINUE ON A POSSIBLE  
GOVERNMENT-OWNED ADD-ON DIFFUSION PLANT ?

Question:

You have indicated that work will continue on the planning for a Government add-on diffusion plant as a contingency measure. Precisely what work on the add-on plant alternative do you anticipate will be done in the months ahead?

Answer:

We expect the private industry approach will work so that an add-on Government-owned plant will not be necessary. But, as the President indicated, ERDA will implement back-up contingency measures so that we can be sure that the U.S. will have additional capacity on line about 1983 to supply domestic and foreign customers.

As to the specific contingency work that will be done, we envision the following:

First, conceptual design activity for an add-on plant has been underway within ERDA for some time and these activities will be continued.

Second, the bill proposed by the President includes a section asking for authorization to begin construction planning and design activities for the expansion of an existing uranium enrichment facility. This authorization would cover work commonly referred to as "Title I" design work.

Third, much of the design activity that UEA will have to undertake in the months immediately ahead will involve work on components that could be used in either a free standing plant or on add-on facilities. ERDA plans to seek arrangements with UEA to purchase such design work so that it could be used for a Government plant if the private venture was unable to go ahead.

ERDA will be sure that the back up contingency measures are coordinated with and do not overlap planning for the private venture. We will have to be sure work on the contingency measure does not preempt resources that would be needed in order for the UEA plan to proceed. ERDA will not, for example, begin any long lead time procurement.

6/27/75



WHEN WILL THE "ORDER BOOK" OPEN?

Question:

When will customers be able to negotiate fuel contracts with private U.S. enrichers? That is when will the "order book" open?

Answer:

A number of private U.S. firms, particularly the UEA which is well advanced, have been actively seeking orders for well over a year and will be in a position to accept service contracts and financial participation arrangements immediately, consistent with the thrust of the President's plan. These contracts would be contingent upon legislative approval, to become firm, but, in any event, they would be covered by the Presidential supply assurances.

In short, the U.S. enrichment "order book" is about to be opened to provide assured and timely nuclear fuel to domestic and foreign customers.

6/24/75

WHAT HAPPENS IF A PRIVATE PLANT DOESN'T WORK?

Question:

What happens if the proposed private diffusion plant doesn't work?

Answer:

The plant will work.

The private diffusion plant will use a process that has been proven and perfected over a quarter century of large scale Government operation. Governmental specialists will be involved in the details of the project and the Government will supply on a full cost recovery basis the key components which are available only from the Government. Again, the project will work.

6/24/75

WHAT HAPPENS IF A PRIVATE PLANT ISN'T LICENSED ?

Question:

What happens if a private plant isn't licensed?

Answer:

There is little reason to believe that the plant would not be licensed. From a health safety and environmental standpoint the project is expected to be much simpler to license than a nuclear power reactor.

Licensability of projects will, however, be a key consideration from the outset and should any difficulties appear they will be recognized early. Under the proposed terms of the cooperative arrangements, the Government would be able to take over a project if a license were not granted.

6/24/75

DOES UEA HAVE CUSTOMERS?Question:

Does the proposed private diffusion plant project (UEA) have all the customers it needs to go forward?

Answer:

We understand UEA has letters of intent from domestic utilities covering about 15% of plant output. Several foreign governments have expressed reasonable firm interest in significant amounts of plant output. As the project comes to be accepted as the next United States enriching plant, it is very likely that customers will begin subscribing to the remaining available plant output.

6/25/75

WHY NO BOARD OF DIRECTORS  
WITH FEDERAL MEMBERSHIP?

Question:

Unlike other occasions when the Government has developed plans for private industry to enter a field that had previously been a Government monopoly, the President's Nuclear Fuel Assurance Act does not provide for a Board of Directors that would include Federally-appointed members to represent the public interest. Why is this not now being done?

Answer:

There is no particular advantage from creating in this instance a Board of Directors with Federal membership. Unlike COMSAT, this legislation does not establish a single corporation, but instead authorizes the Administrator to contract with private companies who wish to enter the uranium enrichment field. To contractually require Federal membership on the Board of Directors of various private corporations would not only present numerous problems under state corporate laws, but would also be unnecessarily burdensome, as the agreements entered into by ERDA will provide for sufficient Government oversight to protect the public interest.

6/25/75

PAYMENTS BY INDUSTRY FOR GOVERNMENT-OWNED TECHNOLOGYQuestion:

Given the heavy investments made by the U.S. taxpayers in the U.S. enrichment program, what compensation is the Government likely to receive for the technology?

Answer:

It is expected that the U.S. Government will charge 3% of the gross revenues of private producers as compensation for the use of its inventions and discoveries. For example, should UEA generate gross revenues of one billion dollars per year, the Government would receive compensation payments of about \$30 million per year in license fees and income taxes of about \$50 to \$70 million per year per plant. Revenues from these industry payments will increase as other private plants--probably using centrifuge technology--begin production.

6/24/75

UNANSWERED SAFETY AND ENVIRONMENTAL QUESTIONSQuestion:

Why is the Ford Administration working to increase the supply of nuclear fuel when there are still significant questions regarding the safety and environmental impact of nuclear power plants?

Answer:

All commercial nuclear power plants in this country are licensed by the Nuclear Regulatory Commission (NRC) after a full review of safety and environmental questions, including the opportunity for public participation.

While there are safety and environmental matters requiring continued attention, the NRC applies conservative criteria to ensure safe performance. The safety record of commercial nuclear power plants has been excellent. There has been no member of the public killed or injured by any accident or occurrence at a commercial nuclear power plant in this country. The overwhelming majority of technical experts in the field are satisfied with the safety of nuclear power plants. However, as added assurance, we are pursuing every opportunity to improve even further the safety of these power plants and waste management. Our safety research program in the Nuclear Regulatory Commission will spend over \$80 million in FY 1976. ERDA expenditures aimed at assuring environmentally sound fuel waste disposal amounts to \$36 million in FY 1976.

Furthermore, nuclear plants offer significant savings to consumers because of the relatively low fuel costs compared to fossil-fired plants. They also can decrease our dependence on foreign oil imports. Without this action now, this nation will not only lose its leadership position in the world market and in technological developments, but will also lack the capacity to meet its own needs for enriched uranium.

6/24/75

NRC SAFEGUARDS AND SAFETY CONTROLSQuestion:

What types of domestic safeguards and safety controls will NRC apply to the UEA and private centrifuge ventures?

Answer:

NRC is expected to require essentially the same types of safeguards and safety procedures as are now successfully employed in Government-owned facilities.

Also, it is to be noted that the UEA plant will be designed to produce only low enriched uranium and, consequently, the safeguards problems for this plant will be even smaller than for the present government plants.

6/24/75



NUCLEAR MATERIAL SAFEGUARDS IMPLICATIONSQuestion:

What are the international safeguards and non-proliferation implications of the President's proposal?

Answer:

This question should be viewed from two aspects: first, what are the consequences of the increased availability of fuel for overseas distribution, and, second, to what extent may the project, including the expected foreign participation, lead to the dissemination abroad of U.S. uranium enrichment technology.

With respect to the first aspect, it should be noted that foreign distribution of material produced by the facilities built under the President's proposal will take place under U.S. Agreements for Cooperation under exactly the same safeguards arrangements applicable to the distribution of similar material from U.S. Government-owned enrichment facilities. Accordingly, there is no negative impact, from the safeguards and non-proliferation aspect, of this arrangement. On the contrary, and far more importantly, the renewed ability to meet overseas needs for enriched uranium which the project will create, will substantially advance U.S. non-proliferation objectives by reducing the pressure for the construction of independent enrichment capacity in other nations, and by strengthening U.S. ability to influence other nation's nuclear programs in directions favorable to U.S. non-proliferation objectives.

With respect to the dissemination of U.S. enrichment, foreign participation in the investment and business management aspects of the facility will involve no access to classified U.S. enrichment information.

While the United States has expressed a willingness, under appropriate conditions, to cooperate with other nations in uranium enrichment technology, proposals for such cooperation would be considered on its merits as a separate matter by the Government.

6/25/75

WILL CLASSIFIED TECHNOLOGY NOW BE MORE  
WIDELY AVAILABLE TO PRIVATE INDUSTRY?

Question:

Would privatization mean that sensitive classified nuclear technology would now become available to private firms instead of remaining confined to the Government?

Answer:

Rigid controls are and will continue to be maintained over access to sensitive classified technology.

Access by selected private industry personnel is not new. Existing enrichment plants, though owned by the Government, were constructed and are operated by private contractors.

We expect that rigid classification and safeguards controls will be applied to the privately-owned capacity proposed in this program.

Even if the Government were to build additional plants private contractors would be heavily involved in their design, construction and operation. Privatization would result in no significant additional access to classified nuclear technology than if the Nation's enrichment requirements were to be met by more Government-owned capacity.

6/24/75

WHY SO MUCH  
EMPHASIS ON URANIUM ENRICHMENT  
SALES TO FOREIGNERS

Question:

Why does the President's plan give so much emphasis to uranium enrichment services to foreign customers?

Answer:

There are several reasons for this, as follows:

1. Foreign customers presently account for nearly one-third of ERDA's sales of enrichment services. These U.S. sales constitute an important element of U.S. exports and generate hundreds of millions of dollars worth of foreign exchange needed to pay for purchases of petroleum, etc.
2. Foreign sources will supply a large fraction of the financing for the UEA plant, thus reducing the drain on U.S. capital markets. Foreign sources may well also participate financially in the subsequent centrifuge plants.
3. The U.S. pioneered development of nuclear power, and the U.S. has a responsibility to continue to help other nations to meet their own energy needs. This is a central element of our foreign policy in the energy area.
4. The U.S. has repeatedly made public commitments that it would be a major and reliable source of enrichment services to foreign customers.
5. ERDA has conditional contracts to supply enrichment services for a substantial block of foreign nuclear power plants, and if these needs cannot be met from ERDA's plants, the private plants visualized by the President's plan will meet this need.
6. The proposal will substantially advance U.S. non-proliferation objectives by reducing the pressure for the construction of independent enrichment capacity in other nations, and by strengthening U.S. ability to influence other nation's nuclear programs in directions favorable to U.S. non-proliferation objectives.

6/25/75

FOREIGN INVESTMENT WITHOUT FOREIGN CONTROLQuestion:

You have indicated that there will be substantial foreign investment in the proposed project -- including investment from OPEC nations. What protection do we have to protect us against potential abuses by foreign investors?

Answer:

First of all substantial foreign investment in this project is desirable to help ease the difficulty of raising the large amounts of capital required for the project. Furthermore, to the extent that funds from OPEC countries are involved, this is precisely the type of constructive use of OPEC money that we would like to encourage.

As a target, the UEA plan contemplates 60% foreign investment, with future centrifuge ventures also involving foreign contributions. These foreign investments allow foreigners access as customers to product output of the plant. The product is made available under Government Agreements for Cooperation and export licenses are required. The investments do not result in access to the classified U.S. technology or in a majority voting right in project management.

U.S. ownership and control is required by U.S. law and will be a necessary condition for obtaining a license from the Nuclear Regulatory Commission. Foreign participation in the UEA project is designed to assure both that no single foreign investor can have a dominant voice in the project, and also that no group of foreign investors, voting as a bloc, can impose their views on U.S. investors.

6/24/75

FOREIGN PURCHASES WITHOUT INVESTMENT?Question:

Will foreign customers be able to obtain uranium enrichment services without an investment in a plant?

Answer:

Foreign investment, subject to U.S. policy regulations, would be welcomed. Foreign investors will be able to purchase fuel in proportion to their investment. It is anticipated that foreign customers who do not invest will be able to contract for uranium enrichment services, within the limits of plant capacity if judged by enrichers to be compatible with their ventures.

6/24/75

INVESTMENT REQUIREMENTS DISCRIMINATE  
AGAINST FOREIGN CUSTOMERS?

Question:

Isn't it discriminatory for foreign customers to be required to invest in the proposed UEA plant in order to obtain guaranteed access to fuel?

Answer:

The concept of requiring plant investments as an entitlement to a proportion of fuel is applicable both to U.S. and foreign users. In the U.S. case, proportional debt and equity will come from domestic lenders and not from the utility customers themselves. Foreign users can also follow this procedure, and raise financing from their domestic lending institutions. Thus, there is no distinction between the treatment of foreign and domestic users.

6/25/75

FOREIGN CUSTOMER CONDITIONAL CONTRACTS WITH ERDAQuestion:

What happens to these foreign customers who have contracts with ERDA that are conditional on plutonium recycle and subject to termination?

Answer:

Holders of such contracts have a Presidential assurance that they will be able to obtain their fuel needs from a U.S. source of supply. The existence of a viable UEA project and commercial centrifuge projects will afford this opportunity. Indeed, a number of countries currently holding conditional contracts are already prospective investors in UEA.

6/24/75

U.S. SHARE OF THE FOREIGN MARKETQuestion:

How much of the foreign enrichment market might the U.S. expect to capture.

Answer:

We cannot predict our share of the foreign market for enrichment services at this time. That share will be determined by our ability to compete with other suppliers. We hope that our sophisticated technological leadership developed over the past 30 years and our proven ability to provide enrichment services will put us in a good position to be a reliable supplier at reasonable prices.

6/24/75



BASIS FOR \$8 BILLION AUTHORIZATION REQUESTQuestion:

What is the basis for the \$8 billion authorization request?

Answer:

The amount set out in Section 3 of the bill is designed to cover the Government's potential exposure for cooperative agreements with private diffusion and centrifuge ventures -- in the event that all the ventures failed.

The firm expectation of the Administration is that none of this money would actually be spent. The authorization is necessary, however, to assure private lenders that the full faith and credit of the U.S. Government is behind the major effort to achieve privatization. This kind of backup assurance is necessary to sign contracts.

The \$8 billion dollars comprises the following items:

- \$1.4 billion for 40% of the MEA for 9 million unit gaseous diffusion plant, i.e., the domestic portion.
- 3.0 billion for 3 to 4 future centrifuge plants totaling 6 to 12 million units.
- 3.6 billion for contingency to cover uncertainties of estimates, amount of foreign equity participation and inflation.

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\$8.0 billion TOTAL

If cost escalations or some other unforeseen and unlikely occurrence were to result in costs above that included in the present contingency estimate, an amendment in this amount may be required.

6/25/75

BASICS OF URANIUM ENRICHMENTQuestion:

What does "uranium enrichment" mean? What does it consist of?

Answer:

Natural uranium contains only 0.7% of the energy-producing form of uranium, U-235, which produces that energy when it splits, i.e., fissions. The remainder of the natural uranium, U-238, the non-fissionable uranium, is not capable of producing energy directly. Uranium enrichment is the process by which the natural uranium is converted into a richer mixture of U-235 (2%-4%) which can then be used in nuclear power reactors to produce electricity. The natural uranium must also be changed chemically into a gas called uranium hexafluoride before it can be enriched.

Question:

Why is the process referred to as a "service"?

Answer:

The plant owner does not sell enriched uranium as such; rather, he sells the service of conducting the enrichment process for the customer. The plant owner (now exclusively the Government) merely processes customer-owned uranium in his enrichment plant.

Question:

How does the gas centrifuge process differ from the gaseous diffusion process?

Answer:

In the diffusion process, the uranium gas is pumped through a membrane, which is in effect a fine filter. The lighter U-235 moves through the membrane more readily than the U-238, and the product, therefore, has a higher concentration of U-235. The centrifuge process is based essentially on the principle of the cream separator used in the dairy industry. The gas is whirled in cylinders at a high speed, and the heavier uranium atoms, U-238, tend to move by centrifugal force to the outside of the cylinders. The desired lighter uranium, U-235, is then extracted from the inside of the cylinders where their concentrations are higher.

Question:

Why is the enrichment process secret or "classified"?

Answer:

The technology is classified because similar equipment could be used in a different plant to make atomic bomb material. The classification is only partial; it relates to such things as the nature of some of the equipment used, such as the membranes, certain pressure seals, etc.

Question:

What is a Separative Work Unit (SWU)?

Answer:

A separative work unit (SWU) is the unit used to measure the work effort required to pump the uranium gas through the separating membrane. It, therefore, is a measure of the amount of enriched uranium suitable for power reactor use, i.e., 3-4% of U-235 that can be produced in a given diffusion plant.