The original documents are located in Box 18, folder "Nuclear Fuel Assurance Act: Fact Sheet and Q.& A.'s (1)" of the Loen and Leppert Files at the Gerald R. Ford Presidential Library.

GLENN:

PASTORE WILL CALL JOINT ATOMIC ENERGY COMMITTEE TOGETHER FOR A BRIEFING ON THIS UE PROPOSAL NEXT WEEK. HE ASKS THAT WE LET HIM KNOW WHEN WE ARE READY TO BRIEF & HE WILL ISSUE CALL TO COMMITTEE MEMBERS.

PASTORE IS MAD BECAUSE THIS HAS BEEN RELEASED TO PRESS PRIOR TO BRIEFING & CONSULTATION WITH THE COMMITTEE. HE WILL STATE AT THE BRIEFING IF WE WANT ONE THAT IT IS A BRIEFING ON WHAT THE ADMINISTRATION WANTS TO DO & NOT CONSULTATION.

CHARLIE.

1) Jimi Connor

2) Schleede

THE WHITE HOUSE

WASHINGTON

June 16, 1975

MEMORANDUM FOR: DUDLEY CHAPMAN
BOB FRI
MIKE GUHIN
JOHN HILL
DIXON HOYLE
TENNEY JOHNSON
JERRY KAHAN
CHARLIE LEPPERT
HUGH LOWETH
JIM MITCHELL
ROGER PORTER
SAM TUTHILL
GERALD WARREN
GUS WEISS
DON WEBSTER

FROM: Glenn Schleede

SUBJECT: Uranium Enrichment - Draft Fact Sheet and Q&A's

Enclosed for your review and comment are the first very rough drafts of a fact sheet and a set of questions and answers. Both packages require a lot of work.

Would you please mark up the packages with corrections, additions, deletions, etc., and return them to me by 5:00 p.m. Tuesday, June 17.

The attached draft Q&A's have not been critically reviewed by anyone. They are merely a collection of those provided from the various groups participating in this project. Please suggest additional subjects that you believe must be included and recommend deletion of those you believe are unnecessary.

Would you please use extra care to prevent this material from getting out of your hands.

Attachment

cc: Jim Cannon
Jim Connor
Rod Hills

Fact Sheet

DRAFT #1
6/16/75

FACT SHEET

URANIUM ENRICHMENT

DRAFT I
6/16/75

FACT SHEET

URANIUM ENRICHMENT

The President today announced a series of Administrative actions and a legislative proposal which are designed to (a) increase the United States' capacity to produce enriched uranium that is needed to fuel nuclear power reactors, (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 of a private, competitive uranium enrichment industry in the U.S. -- ending the current Government monopoly.

BACKGROUND

- Natural uranium obtained from mines in the U.S. and other parts of the world must be refined or "enriched" before it can be used to make fuel for the nuclear reactors which are used in the United States and in most foreign nations to generate electricity.
- The United States is the recognized leader in uranium enrichment technology, which has been developed and is owned by the Government. Details of the technology are classified.
- The 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. These plants, which are now being expanded, will have the capacity to produce enriched uranium needed to fuel about 270 large nuclear powered electric generating plants in the U.S. and foreign countries.
- Since June 1974, the entire expanded productive capacity of the three plants has been fully committed under long term contracts. New capacity must be "on-line" beginning in about 1983 to supply fuel for nuclear power reactors that will be ready to operate then, both here and abroad. Current estimates are that about ___ plants with the capacity of any one of the three U.S. plants will be needed over the next ___ years to meet growing world requirements.
- 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 uranium enrichment capacity in the U.S., thus, ending the Government monopoly that now exists.

- Though several industrial firms are seeking to enter the uranium enrichment field, thus far, none has been able to proceed to the stage of offering firm contracts because of: (a) the complexity of the undertaking, (b) the large financial commitments required, (c) the inherent difficulties of ending a Government monopoly, and (d) the financial situation of utilities which are customers for uranium enrichment services.

- In the absence of firm plans for building new uranium enrichment capacity, some potential foreign customers have begun looking to foreign sources such as the U.S.S.R. and consortia of Western European nations for their uranium enrichment services.

- Before deciding on the action announced today, the President considered other alternatives for adding U.S. enrichment capacity, including the possibility of having future additions to capacity built and owned by the Federal Government.

PLAN ANNOUNCED BY THE PRESIDENT

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

- The U.S. maintains its role as the principal world supplier of uranium enrichment services and nuclear power plants.

- The next increment of uranium enrichment capacity and all future increments will be available when needed to meet the requirements for nuclear powered generating plants in the U.S. and in other nations.

- 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.

- All necessary controls over nuclear materials are maintained, as they would be if the Government were to own the new plants.

Private Uranium Enrichment Industry. After a thorough review, the President concluded that it is feasible and desirable to take steps now that are necessary to assure that private industry will build the next increments of uranium enrichment capacity. Privatization can be accomplished now with:

- Use of existing, proven diffusion technology for the next plant and with the expectation that subsequent plants would use centrifuge technology which is now nearing commercial demonstration.

- Very little risk with respect to the objective of having the next plant on line about 1983 when it will be needed.

- With little or no cost to the Federal Government for building plants and revenue to the Government from royalties on technology.
- All necessary Government controls over Protection and export of nuclear materials, safety, environmental impact, and access to classified technology.
- An early end to the Government monopoly in a type of commercial activity that is normally performed by private industry.

Arrangements with Private Industry. There are several principal elements in the arrangements that would be made with private industrial organizations for future increments of capacity. Essentially the same arrangements would apply to future increments of capacity until a competitive industry is firmly established. New legislative authority will be needed for some elements of the arrangements.

- Private industrial firms would assume the responsibility for providing the organization, management, financing and customers for the plant, and will build and operate the plant.
- The Government would supply technology (and materials, in those cases where the Government is the sole source of supply), for which the Government would be paid by private industry in the form of cash payments and royalties.
    - The Government would warrant that the technology will perform successfully when installed in accordance with specifications.
    - The Government would receive revenue of about $90-100 million per year per plant in royalties.
- The Government would agree to buy from or sell to private producers enriched uranium from the U.S. Government stockpile to accommodate a plant start-up date within a one-year period earlier or later than planned.
- In the event (which is considered unlikely) that a private venture threatened to fail, the potential producers would have the right to sell assets and liabilities to the Federal Government or the Federal Government would have the right to assume assets and liabilities of the project at any time up to the first full year of commercial operation of the plant. The Government would take over the project, complete and operate the plant just as it now operated the 2 existing Government-owned enrichment plants.
- The compensation to the equity holders -- in the event the transfer of ownership became necessary, would depend

upon the circumstances involved and would range from total loss of investor equity to full and fair compensation to equity holders if the venture could not proceed because of governmental action.

- The factors which would lead to the Government taking over a project at full compensation to the equity holders are limited; e.g.,

  - Inability of the private firm to obtain the necessary permits and licenses -- which should not be a serious problem in the case of a uranium enrichment plant;

  - A Government decision to restrict the sale of uranium enrichment services for foreign policy reasons.

- Congress would have the right to review proposed compensation to the equity holders.

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

- The arrangements would end after 1 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.

Government Assurances for Customers. The 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. The Government would give assurance to customers, domestic or foreign, that orders placed with private enrichment firms will be filled in the order in which they are placed -- in the unlikely event that a private venture failed.

Compliance with Existing Law. Private firms building uranium enrichment plants under the proposed arrangements will be subject to all existing laws. For example, a private firm would have to obtain from a construction permit and an operating license from the Nuclear Regulatory Commission (NRC). Before granting a construction permit, the NRC considers safety, environmental impact, protection of nuclear materials (safeguards), and anti-trust matters. The anti-trust review is conducted in cooperation with the Justice Department.

SPECIFIC ACTIONS OUTLINED IN THE PRESIDENT'S MESSAGE

The President's message outlining his uranium enrichment plan detailed a number of specific actions, some of which can be carried out under existing authority and others requiring new legislation:

. New legislation. The President proposed legislation that would authorize the Energy Research and Development Administration (ERDA) to enter into contracts -- which would be subject to Congressional review -- which permits ERDA to:

  - assume assets and liabilities of private uranium enrichment projects 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 circumstnaces leading to the threat of failure.

  - assure the delivery of uranium enrichment services to customers placing orders with private enrichment firms that enter into the proposed contracts with the Government.

. Actions under existing authority. Authority is already available under existing law to carry out other aspects of the proposed arrangements with private industry, including the following actions by ERDA:

  - supply Government-owned technology and warrant that technology -- for which the Government will receive royalty payments.

  - sell certain materials and supplies which, because of their classified nature, are available only from the Federal Government.

  - buy or sell enriched uranium from the Government stockpile to accommodate an earlier or later than planned plant start-up date.

. Other Administrative Actions Announced. The President announced that:

  - ERDA would be responding formally to a proposal from the Uranium Enrichment Associates (UEA) offering to enter into negotiations which could lead to construction by UEA of a $3.5 billion diffusion plant which would be on line by 1983. (Details below).

- ERDA issued a modified request for proposals from industrial firms interested in constructing demonstration scale enrichment facilities making use of centrifuge technology.

- ERDA would, within a few days, issue for public review and comment a draft environmental impact statement covering actions concerned with the expansion of uranium enrichment capacity.

- ERDA will continue conceptual design work for a Government-owned add-on plant at ERDA's Portsmouth, Ohio, facility -- pending Congressional action on the legislation needed to carry out the President's plan.

DEVELOPMENTS LEADING TO THE PRESIDENT'S PLAN

Government Owned Technology. The 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 at least 3-4% through a process of separating off other isotopes.

- Diffusion Technology. 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. All agree that the next increment of capacity should make use of this technology.

- Gas centrifuge technology. The gas centrifuge process of uranium enrichment provides an alternative to gaseous diffusion. If the projected economics of the process are realized in demonstration, gas centrifuge will be a far preferable process for the future. Full operation of a pilot plant is scheduled for early 1976. This technology probably will be used as subsequent increments of capacity are added.

- Laser Separation. A program is now underway to develop this process which, if successful, will provide an even more advanced process for uranium enrichment in the future.

Private Industry Access. The technology for uranium enrichment is secret, and shall remain subject to continued classification, safeguards and esport controls. Beginning in 1971, the Atomic Energy Commission (AEC) asked private firms to consider building, owning and operating enrichment plants and granted qualified U.S. firms access to 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. Some 21 (?) firms responded to the invitation from which several consortia have emerged which are interested in pursuing the possibility of building enrichment plants.

One consortium -- the Uranium Enrichment Associates -- 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.

Other consortia 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. 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.

The basic approach to a cooperative Government-Industry agreement which is outlined in the President's plan was developed on the basis of a recent proposal submitted to the ERDA by the Uranium Enrichment Associates.

The UEA Proposal. Uranium Enrichment Associates is a consortium currently consisting of Bechtel Corporation and the Goodyear Tire and Rubber Company. The principal features of the UEA proposal are as follows:

- Physical Description of the Project. UEA proposes to construct a nine million separative work unit per year gaseous diffusion enriching plant to be located 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 approximately two years earlier. 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, in effect, be processing and upgrading natural uranium and thus will have essentially no radiation hazard. In many respects 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 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 sale of enriched uranium. 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 on the basis of the security of long-term (25 year) "take or pay" enriching 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. 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 information. 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 addition utilities are now evaluating their requirement for services. UEA has made extensive marketing contacts overseas and anticipates that purchase commitments from Iran, Japan, West Germany, France, Spain, Taiwan and other countries.

. Government Backup Assistance. 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. This will assure that the anticipated output from the plant can be achieved. Accordingly, UEA has proposed that the Government:

1. Supply, at cost, essential mechanical components presently produced exclusively by the Government.

2. Supply the Government's gaseous diffusion technology and warrant its satisfactory operation.

3. Provide limited access to and from the Government's stockpile of enriched material to balance significant start-up loading problems during the first years of operation.

UEA has also proposed that:

1. Prior to commercial operation and standby Government financial backup lasting for the critical construction period plus one year is proposed to offset the current weak credit position of the U.S. utility industry and give confidence to commercial lenders. UEA may require 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. The Government, at such call of UEA, has the right to acquire UEA's domestic equity position and the obligation to assume UEA's liabilities and debt.

2. The Government may also require UEA to release the project to the Government if the Government's interesst demands and thereby will be obligated to assume UEA's liabilities and debt.

3. 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.

Demonstration Centrifuge Enriching Projects. In August of 1974 the Government announced a program expected to lead to several relatively small industry constructed demonstration projects. Gas centrifuge technology, though highly developed in the United States and highly promising, has not yet been applied on a production scale sufficient to permit full industry commitment to large plants. It has been determined through extensive discussions that 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 partnership arrangement similar to that required for the UEA project is required. A Request for Proposals for this program which extends and elaborates upon the earlier program was issued today. Proposals are due on _____ 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. It is expected that small initial modules, perhaps 200-300 thousand SWU's/Year, could be in operation in the early 1980's with 2-3 million SWU/year plants achieved in the mid-1980's on a time frame consistent with the growth of the market. It is one of the characteristics of centrifuge enriching that small capacity increments can be added 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 gives assurance of the development of a competitive, private enriching industry and of the maintenance of U.S. world leadership in this field.

Uranium Enrichment as Part of the Nuclear Fuel Cycle

The enclosed figure provides a schematic of the nuclear fuel cycle for Light Water Reactors. 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

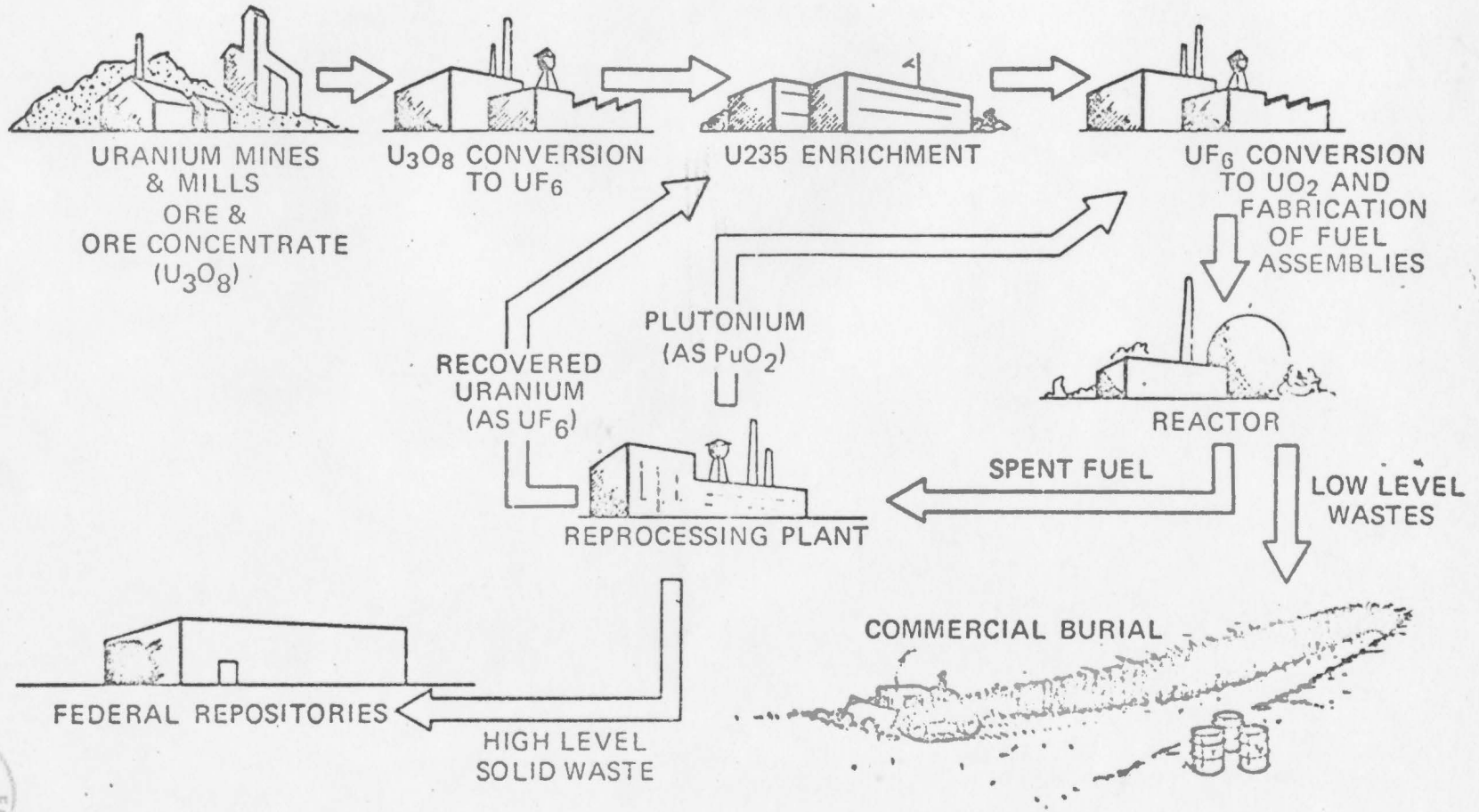
collected from the plant and sent to a fuel fabrication plant. In this plant, the uranium is converted to pellets of uranium dioxide, UO_2, and placed in zirconium tubes. The tubes are assembled into bundles and sent to nuclear power plants. Seven U.S. companies are involved in the fabrication of nuclear 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



Q+A's

6/16/75
DRAFT

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:

ERDA is indeed doing a good job and is making constructive use of extensive facilities originally built primarily for military purposes. But there are several reasons for ending the present Government monopoly, as follows:

- 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. The U.S. Government is already heavily and increasingly burdened with a multiplicity of responsibilities. We should not continue to expand these Governmental responsibilities within our free enterprise system when private industry is able and willing, under appropriate Government licensing, to provide the service.

- Second, it is reasonable to expect that a private enrichment industry, which will soon involve several different firms, will display an initiative and competition which will better meet national needs and the public interest than continued Government monopoly. Also, the private venture will generate revenues to the Treasury through payment of Federal income taxes and royalties for Government-owned technology.

- Third, it must be recognized that within the next 15-20 years, the U.S. must add enrichment capacity equivalent to more than 3 times that which is now in being or planned by ERDA. The new capacity will cost well over $10 B in capital costs alone, and without any allowance for inflation (which could raise the cost to $15-20 B 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 plan for and undertake in a free enterprise system when private industry is ready to do it.

6/16/75
DRAFT

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, over the past three years a very substantial private venture (UEA) has been established. It 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.

- Second, by using the existing gaseous diffusion technology, the technological risk of the UEA venture is reduced. This in turn means that it can be financed largely through sale of bonds, rather than common stock, and this will reduce the cost of the product.

- Third, the present UEA venture has been developed in response to an invitation and challenge by the Executive Branch. If the Government now rejects this responsible and serious proposal, such an action will discourage subsequent private ventures and will encourage potential utility customers to believe that the partially subsidized and relatively comfortable Government monopoly will be perpetuated.

- Fourth, facilitation by the Government of construction by private industry of subsequent increments of capacity using the centrifuge technology is an essential and integral part of the Administration's plan, and approval of the UEA venture will not only fulfill immediate needs but will also serve to "break trail" for subsequent ventures using a less proven technology.

CUT-OFF DATE ?

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

First, the risk of UEA failure is considered minimal. 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 committment 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 monotoring 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 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 would undoubtedly be the case that it will be more advantageous for the Government to proceed with the free-standing plant than to revert to an add-on plant.

(more)

Because of the arrangements that have been designed, it would be inappropriate to pick a single "cut-off" date. To do so could have the effect of encouraging those who prefer a Government plant to the President's decision to seek delays until the date is reached. Furthermore, a single date would be inconsistent with the basic plan and is unnecessary since the plan provides for close and constant monitoring so that actions can be taken in time to prevent delays in bringing the plant on line beyond the date that it is needed.

2.

WORK CONTINUE ON ADD-ON PLANT?

In light of the President's decision to proceed with immediate privatization of uranium enrichment, what work will be done and what will not be done on the proposed 5 million unit add-on diffusion plant?

- Work already underway includes:
  - Conceptual design work for the plant (Not Title I or II)
  - Preliminary discussions with power suppliers

  (This work is being financed from a $5 million ERDA appropriatic which also pays for work on the centrifuge demonstration program.)

- Work that will be continued and which does not require either additional authorization or appropriations includes:
  - Continue conceptual design work for the add-on plant.
  - Begin discussions with suppliers to get information on materials and equipment availability, scheduling and prices. Perhaps discuss contract terms.
  - Continue discussions with electric power supplier.

- Work that would not be done -- which might have been undertake if the President selected the add-on plant option -- includes:
  - Anything requiring additional authorization or expanded appropriations, such as:
    - Title I and Title II design work.
    - Long lead time procurement.
  - Actions that might compete for supplies, equipment or resources that will be needed to proceed expeditiously with the privatization option selected by the President.

6/16/75
DRAFT

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:

There is every reason to expect that, given access to secret Government technology (for which royalties will be paid), the UEA venture and the subsequent private centrifuge ventures will move ahead with virtually no Government involvement. But there are at least two reasons why some stand-by Government assurances are needed as part of the "cost" of ending the present Government monopoly, as follows:

- First, because the demand for uranium enrichment services is large and is rising rapidly, this first-of-a-kind UEA venture will be (from the very outset) a very large undertaking, involving construction costs alone of nearly $4 billion, even without regard to future inflation. These funds must be raised in the commercial money markets, and in order to get appropriate private debt financing at reasonable interest rates, there needs to be some degree of stand-by Government assurances to reduce the risk to investors in the remote event that the venture should threaten to fail. It is proposed to avoid the use of a loan guarantee by substituting other arrangements, including a buy-out future, which seem more appropriate.

- Second, in order to provde some stand-by protection for the UEA venture and perhaps the first few succeeding private ventures, appropriate Government measures are needed to assure the 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 national demand for electricity, a substantial part of which must be met by nuclear power from proven light water (and high temperature gas?) reactors.

6/16/75
DRAFT

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:

The safety record of commercial nuclear power plants is nearly perfect. There has been no member of the public killed or injured by any accident or occurence 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.

In actuality the currently reported prices being charged by foreign suppliers range from $75 to $100. The difference is due to the fact that ERDA's low charge is based in part on the very low cost of its enrichment plants, which were built in the 1940's and 1950's to meet military needs. The proposed legislation would raise the current price to a level similar to that which will eventually be charged by the private enrichment suppliers in this country.

Draft
6/16/75

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 respond by first addressing the general issue of the desirability of foreign investment in this type of a 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 how OPEC capital can be used to help develop alternative energy sources. This is precisely the type of constructive use of OPEC funds that we would like to encourage.

With respect to the more specific issue of safeguards against abuse, it should be pointed out that no single foreign investor will have a dominant voice in the project. We would expect that the contributions would come from a number of nations, none of which would control or influence the project in a major way.

Lastly, there are specific safeguards contained in the Atomic Energy Act of 1954. Specifically, Sections 103(d) and 104(d) of the Act prohibit the Atomic Energy Commission from issuing licenses to private entities for the construction and operation of production facilities (e.g. a power reactor or an enrichment plant) "if the Commission knows or has reason to believe that it (the private entity) is owned, controlled or dominated by an alien, a foreign corporation, or a foreign government" (see 42 USC 2133(d) and 2134(d).

Thus, the AEC must be satisfied that a foreign government's investment does not give it the power to control or dominate the project before it can issue the appropriate license.

Draft
6/16/75

PLANT SAFE?

Question:

How will you get private industry to be sure the plant is safe?

Answer:

The UEA plant and succeeding plants will be subject to licensing by the Nuclear Regulatory Commission to ensure the safety of their operation. There is no radiation involved in this part of the Nuclear power process so there is no nuclear safety problem.

Draft
6/16/75

Nuclear Materials Safeguards

Question

How will you get industry to prevent the loss or theft of materials which can be used to make nuclear bombs?

Answer

The plant will be subject to licensing by the Nuclear Regulatory Agency which will make sure that all safeguards (i.e., provision of unlawful diversion of enriched uranium) requirements are met. In any case, the problem is minimal because the UEA plant will not be physically capable of producing weapons-grade uranium. The follow-on centrifuge plants will also be designed and licensed in such a way to protect against unlawful diversions.

6/16/75
DRAFT

BREEDER NO LONGER NEEDED OR EXPECTED?

Question:

Does this proposal mean you no longer expect breeder reactors to work?

Answer:

Meeting national power needs for the remainder of this century will require increased use of nuclear power reactors of existing design, even with the expected success of breeder reactors. Existing reactors must be fuelled by enriched uranium. Large enrichment plants of the sort now operated by ERDA at Oak Ridge and elsewhere are essential to do this job, and the UEA plants and succeeding private centrifuge plants will meet growing future demand.

DRAFT 6/16/75

diffusion

1. Q - Was ERDA overruled on its proposal to build an add-on gaseous plant?

A -

From the analysis there emerged two proposals which were actually quite similar in terms of additional diffusion capacity, handling of safeguards, and centrifuge capacity. What it boiled ~~down~~ down to was the issue of risk and congressional acceptability. Both alternatives would be difficult for Congress to ~~do~~ act. It was a very close choice. Based on a thorough evaluation, the benefits of immediate privatization (in terms of meeting our objectives) and the steps developed to reduce risk made it worthwhile to undertake the difficult task of ~~[redacted]~~ education and information that will be needed to sell the idea of immediate privatization.

2 Q - Was Kissinger also opposed?

A - Same as answer to Question # 1.

Draft
6-16-75

3. Q - If so, does this suggest that the technical people have doubts about the viability of the UEA proposal?

A - Some of the technical program people at ERDA appear to believe that construction of an add-on Government diffusion plant would be a better course of action than facilitation of the UEA proposal. That does not necessarily mean that they have doubts about the viability of the UEA proposal.

4.a. Q - Are we setting an undesirable precedent here for the spread of sensitive enrichment technology?

A - No, because the sale of enrichment services to foreign countries by U.S. private firms need not involve transfer of technology.

4.b. Q - Are we setting an undesirable precedent here for other plants in other countries also to "go private"?

A - No, there is no reason to believe that we are setting a precedent for other countries to "go private." It appears, rather, that the arrangements being pursued in those nations which are pursuing uranium enrichment projects follow the particular needs and preferences of those countries.

5. Q - What, indeed, is the national and financial makeup of URENCO, EURIDIF, etc?

A - As far as is known, EURIDIF and URENCO are national efforts in France and Germany/U.K./Netherlands, respectively. The financial arrangements involve a mixture of public financing and financing by major foreign customers.

6. Q - Are we prejudicing, by planning foreign participation, our ability to withhold enrichment technology from other nations?

A - There appears to be no reason to believe that foreign participation in UEA will prejudice the ability of the U.S. to withhold uranium enrichment technology from other nations. At the present time, UEA's arrangements with its potential foreign partners do not provide for transfer of technology. While it is possible (especially in the case of France) that such transfers of technology may be desired by a particular foreign nation, the authorization of such technology transfers can and should be handled separately. Moreover, one of the plans which was advanced for continued U.S. Government construction of uranium enrichment plants visualized the possibility of foreign financial participation in such plants.

7. Q - Will there be any quantitative limits as to how much foreign investors will be able to invest in the UEA venture? Will there be any "per country" limitation?

A - The percentages of the UEA financing represented by potential foreign financial participation are well known, i.e. Iran 20-30%, Japan 10-20%, France 10%, etc. UEA expects to hold the aggregate of foreign financial participation to no more than 60%, and the extent of foreign control will be 45% or less. It is presumably possible that the "mix" of foreign financial participation may in the end prove to be somewhat different. Our understanding is that the limits of foreign financial participation have been established by UEA itself, and they appear to be generally reasonable. It is expected that UEA would be responsive to suggestions from the U.S. Government with regard to significant departures from established levels.

8. Q - Will the proposed transfer to the private sector weaken our classification constraints and controls on technology? Are many more people likely to obtain access to the technology?

A - As to weakening of constraints and controls, the answer to this question is the same as the answer to question 4a. As to access by additional people, it is to be expected that creation of UEA and (subsequently) centrifuge enrichment firms will inevitably increase the number of people with access to uranium enrichment technology, but this will be done under appropriate security safeguards. The same kind of distribution of information technology is presumably in several ~~other~~ foreign nations as well.

occurring

9. Q - Will investment in the UEA Plant be an absolute precondition to foreign purchases? What happens to those foreign groups that now have conditional contracts?

A - Our understanding from UEA is that investment in the UEA plant will not be an absolute precondition to foreign purchases, since UEA appears to be considering a German interest in buying product without financial participation. With respect to foreign groups which now have condition~~s~~ al contract~~s~~ , it is to be expected that ERDA will not be able to honor those conditional contracts if NRC does not approve plutonium recycle prior to 1978, as now expected. Since the 20,000-odd megawatts of foreign power plants of conditional foreign contracts are for the most part with the same countries (e.g. Japan, Iran, Western Europe) as are dealing with UEA, it is to be expected that these orders will be taken over by UEA as part of the 60% foreign participation in UEA.

10. Q - What types of safeguards will NRC apply to the UEA and private centrifuge ventures?

A - As far as is known, NRC will apply to UEA and the private centrifuge ventures the same types of safeguards as ERDA itself would be likely to apply to its own enrichment plants.

11. Q - Is it true that UEA has not been able to put together a viable package over the past two years? What makes us confident the project will fly now?

A - The efforts by UEA to establish a viable venture have been underway for three years. Because of the extraordinary difficulties and obstacles which have been encountered by UEA, it is not yet a going concern. However, it seems hardly surprising that establishment of an island of private enterprise in an ocean of Government monopoly would be a difficult and time-consuming task. The UEA venture appears to be well advanced at the present time beyond its status as of a year ago. The basis for confidence lies not only in the relative progress which UEA has made but also the absolute status of its arrangements and negotiations with customers, financeers, and the Government.

12. Q - What confidence does the USG have that centrifuge technology can be reliably applied by private firms?

A - At least four private firms (Exxon, Centa:r, Garrett, and, to some extent, Goodyear) are spending significant sums on creation of centrifuge ventures and give every indication of active interest. The U.S. Government has high confidence that centrifuge technology can be reliabl: applied by private firms. It may be stated that Exxon is conducting substantial development efforts of its own, and Garrett has for many years been a contractor to AEC and ERDA.

13. Q - If in the event UEA fails to get off the ground, what are the likely outer costs to the Government likely to be?

A - In the event UEA falters, the likely outer limits of U.S. Government obligation is estimated at $_____ million. However, it must be recognized that, in that event, the USG will acquire assets on a comparable scale. Moreover, approximately the same degree of Government investment would be necessary in the absence of a UEA venture.

14. Q - Wouldn't U.S. exports of enriched uranium contribute to proliferation risks abroad?

A - To the extent that exports of U.S. enriched uranium services are used to fuel foreign nuclear power plants, it is, of course, true that such exports contribute to proliferation risks abroad, because any nuclear power plant is capable of producing plutonium with low- enriched uranium. However, this same risk exists whether the U.S. enrichment services are provided by private industry or by Government.

15. Q - Will the U.S. export fuel only to NPT parties or show preference to treaty parties?

A - The answer to this question has not yet been worked out, and the U.S. policy in this regard will be developed by the Department of State, with participation by ERDA.

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

A - The informal objective set by planning within the U.S. Government is to retain in the long term approximately 50% of the foreign market for uranium enrichment services, excluding Mainland China and the Soviet Bloc.

17. Q - 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?

A - It is expected that the U.S. Government will charge about 3% of the gross sale price of enrichment services for the use of its diffusion or centrifuge technology. Assuming that, at some future time, UEA will sell 9 million SWUs per year at a unit cost of $100, generating gross revenues of $9 million per year, such a level of activity would result in royalties to the Government of about $27 million per year. Such a level would, of course, be increased by whatever additional plants come to be built.

QUESTIONS - UEA PROJECT

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

A. Letters of intent from domestic utilities covering about 15 percent 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, it is believed that customers will subscribe to available plant output.

Q. What happens, if the plant isn't licensed?

A. There is no reason to believe that the plant would not be licensed. From a health and safety point of view the project is expected to be much easier to license than nuclear power reactors. Licensability of the project will 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.

Q. What happens if the plant doesn't work?

A. The plant will use a process that has been used and defined for 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.

Q. Why did Westinghouse and Union Carbide drop out?

A. We understand that potential large future investments required and the likely very long payout periods coupled with competition for capital funds within those companies were factors in their decisions.

Q. How much could it cost the Government if the project doesn't work?

A. As stated earlier, we believe there is negligible chance that process difficulties will be encountered. Thus, there should be no cost to the Government.

Q. Why did UEA choose a diffusion instead of a centrifuge process?

UEA has stated that they judged that there was less risk to the gaseous diffusion process in relation to the time frame in which the market demanded that new capacity be brought on line.

Q. Why does the project take so much power?

A. Large quantities of a gaseous uranium compound, uranium hexafluoride, must be moved through a large number of diffusion stages, each of which enriches the uranium to a small degree.

Q. Are the owners of the project guaranteed a profit?

A. The pricing of services from the plant contemplate an after tax return on equity of about 15 percent. Thus if the project is successful the owners should realize a profit. However, a particular profit (or any profit) is not guaranteed. The principles of Government involvement in the project relate owners' performance to what the Government might have to pay if it took over the project. Contracts between UEA and customer utilities remain to be finally negotiated but might well include incentive and penalty arrangements affecting profit.

Q. Which are the other companies that will join UEA?

A. This is a question that should be posed to UEA. We understand that a number of other companies have been contacted over past months.

Q. What happens if foreign countries don't sign up?

A. We anticipate that foreign countries will sign up since there is a projected serious shortage of enriching services and U.S. Government involvement in the project will give assurance that the services will be available. Failure to achieve the projected degree of foreign sign-up over the next few months would not necessarily slow the schedule.

Q. Why has the Government price for enriching services been so much cheaper than UEA projects?

A. Heretofore Government prices have been based upon Government costs. The existing facilities were built in an era of cheaper construction costs and were partially depreciated against National defense production. Furthermore, certain private costs, e.g., taxes, royalty are not considered in the

Government price. The cost of constructing new Government facilities at a new site are not likely to be appreciably different than the cost of constructing new private facilities such as UEA's.

Q. How can be sure that needed foreign capital will really be provided?

A. The project sponsors anticipate that all foreign capital needed to complete the project in advance, perhaps through irrevocable letters of credit drawn on U.S. financial institutions with funding available to the project as needed in accordance with previously defined procedures.

Q. Why does the Government have to guarantee plant performance?

A. In spite of the many years of successful Government experience the process has no commercial process history; many process details have been, and must remain, secret. Under these conditions commercial lenders are unable or unwilling to consider making available the very large sums required without an assurance from the Government that the plant will perform.

Q. How much royalty payment will the Government collect?

A. The Government royalty is 3 percent of the gross sales for 17 years. At plant capacity, 9 million SWU's/year, and assuming the unescalated $73/SWU selling price, annual Government royalty revenue from the project would be about $____ million.

Q. How will the Government backup "offset the current weak credit position of the U.S. utilities"?

A. Financing of the UEA project is based upon the security of long-term take or pay contracts with customer utilities; however, in some cases, the credit worthiness of some U.S. utilities has deteriorated this impacting project financability. Government support will provide assurance from a credit worthy source, that necessary capital can be raised.

Q. Can the Government take over the project at any time?

A. The Government would have rights to take over the project, and assume both rights and liabilities of equity holders, if it appeard that, for any reason, and at anytime, that the project might not be physically completed and brought into commercial operation by UEA. Furthermore, if UEA has defaulted in meeting conditions of its agreement with the Government, the Government could take over.

Q. What essential mechanical components will the Government supply? Where are they made?

A. The Government will manufacture barrier material and certain compressor seals, both classified materials, for the project. These will be produced at the Government plant at Oak Ridge, Tennessee.

Q. What sort of access to and from the Government stockpile will UEA have?

A. A feature of the cooperative arrangement is that the Government will "back stop" the project for a limited period, if the project is late in achieving projected capacity, so that contractual commitments of the project can be made. Material equivalent to about one year's production from the UEA plant would be set aside by the Government from its stockpile of material to honor this commitment. If material is in fact, needed it would be either purchased

by UEA or "honored" and returned at a later date.

Q. How will the Government protect its interest in the UEA project.

A. The Government will carefully monitor the project and participate in key project decisions. In effect it will be a team effort to assure that the project will be a sound one.

Q. With capital markets so tight will UEA really be able to raise the necessary debt funding.

A. Under the conditions of Government team involvement in the project there is believed to be no problem in raising the necessary funding in the private capital markets.

Centrifuge Enrichment Projects

Q. Why do you feel United States centrifuge technology is the most advanced in the world?

A. This is our firm opinion based upon reports available to us concerning the status of efforts in other countries and our knowledge of the firm theoretical and practical foundation upon which the status of sophisticated U.S. technology rests.

Q. Is centrifuge enriching cheaper than diffusion enriching?

A. The SWU costs from the first generation of centrifuge projects may be about the same, possibly even somewhat higher, than diffusion. However, the centrifuge process is believed to have greater cost reduction potential since it is newer and is lower on the "learning curve". Furthermore, it is much less sensitive to the rising cost for electrical power.

Q. Why was the April 1 date for submittal of proposals under the DCEF program postponed?

A. It became apparent that responsive proposals, under the original DCEF concept, would not have been forthcoming by that date. At the same time the entire structure of the program for achieving new United States enriching capacity was under rereview by the newly constituted Energy Research and Development Administration.

Q. What sort of Government assistance will be required for Centrifuge Enrichment Projects?

A. Similar types of assistance to that required for the UEA project will be necessary. A Government-industry team approach concept will also be necessary for Centrifuge Enrichment Projects.

Q. How can security be maintained with so many companies and people involved?

A. Well tested and controlled security procedures govern all companies and people. This problem has been faced and accommodated successfully many times in the past.

Q. Can foreign firms participate in Centrifuge Enrichment Projects?

A. Yes, but they cannot be allowed access to classified technology.

Q. How many CEP's does ERDA expect to accept?

A. This will depend upon many factors, the desire to achieve a competitive industry, the capabilities of interested companies, the degree of risk and

commitment assumed by those companies, the cost of the program to the Government etc. We hope that several companies may be selected.

Q. Can the centrifuge process be used tomake nuclear weapons material?

A. The physical design of the facilities will be established in a way, and monitored during operation, thatproduction of highly enriched uranium would not be possible without extensive changes detectable by safeguards procedures.

Centrifuge Program Questions and Answers

1.Q. What is current objective of U.S. gas centrifuge program?

A. To carry out a research and development program to provide sufficient data and experience on high performance centrifuges and centrifuge process plant operations to establish a sound base for evaluating the gas centrifuge process for new uranium enrichment plants.

2.Q. What is the status of the centrifuge R&D work?

A. The development effort continues to show significant progress. The ERDA centrifuge program has three sets of reliability models on test and under development. Studies to select an advanced model IV design have started. Although much work must yet be done to establish firm operating data and experience, the progress looks encouraging.

3.Q. What is the Component Test Facility (CTF)?

A. The CTF is a demonstration pilot plant for final proof of the overall centrifuge process. This will be the first U.S. gas centrifuge pilot plant. It is scheduled for startup in FY 1976. The separative work output of this pilot plant will be appreciably greater than the reported 25 MTU SWU/year capacity of the Dutch plant at Almelo in the Netherlands.

4.Q. What are the principle advantages of the gas centrifuge versus the gaseous diffusion process?

A. The centrifuge has the advantages of: (1) low power requirements which is about one tenth (1/10) of the power required for the gaseous diffusion process; (2) diverse employment and investment opportunities; (3) dedicated power plant probably not required; and (4) less sensitivity to plant scale effects.

5.Q. What are the relative disadvantages of the gas centrifuge versus the gaseous diffusion process?

A. The principle disadvantage of the gas centrifuge process at this time is the need of process component experience and long-term plant operating experience comparable to that available in the gaseous diffusion process.

6.Q. What savings might accrue from the selection of the gas centrifuge process instead of gaseous diffusion, for adding new plant capacity?

A. Based upon current cost projections the savings could be about $5-7/SWU for the gas centrifuge over gaseous diffusion. Actual savings will be determined by the final results of the centrifuge development program. We will continue to update the economic assessment based on the data being obtained from the development work.

7.Q.

8. Q. Is the U.S. engaged in technical cooperation with other countries in the development of gas centrifuge technology?

A. No. There was such an exchange with the U.K. starting late in 1960 but this was terminated in 1965. Generally the countries conducting centrifuge development have agreed to classify their work and/or treat their work as proprietary.

9. Q. What other countries are known to be working on gas centrifuge development?

A. The Tripartite Group of West Germany, The Netherlands and the U.K. have a very active centrifuge development program. France and Japan have also reported on their work in this area. Israel and Australia have indicated their interest in centrifuge. The activities of USSR, East Germeny and China are not known; however, it is only prudent to assume that they are conducting development work in this field.

10. Q. How much has been spent on the U.S. gas centrifuge effort through FY 1975?

A. Since the major effort was started on the program in 1960 approximately a total of $195 million has been spent.

11. Q. Where is the ERDA gas centrifuge work conducted?

A. The government gas centrifuge work is carried out primarily by the Union Carbide Corporation, Nuclear Division (UCC-ND), at Oak Ridge, Tennessee and The Garrett Corporation, AiResearch Manufacturing Company at Torrance, California. These organizations are assisted by the University of Virginia, a Flow Theory Study Group, headed by Dr. Lars Onsager of the University of Miami, and the Electro-Nucleonics, Inc. of New Jersey; Los Alamos Scientific Laboratory and Lawrence Livermore Laboratory.

Q. With private industry now ready to get into the uranium enrichment business, what will happen to the existing plants?

A. The steady state enriching capacity of the existing plants is now tied up under long term contracts with the nuclear power industry. The UEA project is only the initial increment of added capacity which must be built to satisfy the expected growth of the nuclear power industry. It is our expectation that the output of the existing plants will be needed for the next several decades.

Q. What is the Cascade Improvement Program (CIP)?

A. The CIP is the most economical means available for increasing the capacity of the existing gaseous diffusion plants. This is accomplished by incorporating into the existing process equipment the latest diffusion technology, thus increasing the plants' efficiency and obtaining additional capacity without an increase in power consumption.

Q. What is the Cascade Uprating Program (CUP)?

A. The CUP is a program to increase the capacity of the CIP improved plants by incorporating changes to effectively use additional electrical power in the existing gaseous diffusion plants.

Q. What is the cost of the CIP and CUP programs and how do these costs compare to the cost of providing this added capacity by building new plants?

A. In terms of FY 1976 dollars the cost of the CIP is estimated to be $830 million and the cost of the CUP is estimated to be $320 million. Assuming a 10% cost of money and a 10 year capital recovery period the capacity added by the CIP is obtained at a cost of about $24 per separative work unit (SWU). On this basis the capacity obtained from the CUP is about $35 per SWU, assuming electrical power cost of 10 mills per kilowatt-hour. Uranium Enrichment Associates (UEA) has estimated a cost of $73 per SWU based on a new 9 million SWU plant to cost $2.75 billion.

Q. How does the UEA 9 million SWU/year plant compare in capacity to the government's three existing plants?

A. The UEA plant will have about the same capacity as one of the government's existing plants.

Q. How does the $3 billion dollar price for UEA compare to the cost of a government expansion at the existing sites?

A. A similar add-on plant would cost less because of the use of common facilities at an existing site.

Q. How long will it require to get a construction permit for a new plant?

A. The present NRC estimate from time of receipt of an acceptable PSAR is about 15 months with anti-trust problems possibly on the critical path before issuance of a construction permit.

1. What is the cost of the add-on plant proposed by the government compared to the UEA plant?

ANS. A cost estimate for a government plant will be available this fall.

2. Will this UEA plant satisfy the need for separative work for the foreseeable future?

ANS. No. ERDA projections call for about seven plants of 9 million separative work units capacity each to meet U.S. Requirements thur year 2000. A world-wide need for about 20 enrichment plants of 9 million separative work units capacity each has been projected.

3. Why is the first new plant a diffusion plant rather than gas centrifuge?

ANS. The gaseous diffusion process has been used in the U.S. since the 1940's and is the chosen process because of the assurance of providing services on a reliable, competitive basis. Power is a significant cost component, but not so costly as to be the deciding factor in plant process selection. The important considerations at this time are reliability and assurance of supply, as weighed against alternative processes such as the gas centrifuge which has yet to be demonstrated in a large scale production plant.

4. Can the conceptual design work for new government plants be stopped now that industry is proceeding to build new capacity?

ANS. No. The U.S. is continuing to advance the development of both gaseous diffusion and gas centrifuge technology. Conceptual studies for both processes would continue. These efforts are directed toward providing the technology for an assured supply of uranium enriching services at a reasonable cost. With two technologies available to select from, opportunities are available for the private plant owner to select the best enrichment process to meet his specific goal for future enrichment plants. All data and designs are being continually transferred to U.S. industry participating in the access permit program for use in planning for their entry into the enrichment business.

5. If a larger capacity add-on gaseous diffusion plant were wanted what is the maximum expansion that could be made at the existing selected plant?

ANS. We have studies on a plant of 8.75 million SWU/year and it is feasible to add-on at least that much capacity. Further expansion is possible but has not been fully studied to determine its feasibility.

6. What would it cost private industry to replace the existing three government plants?

Answer. The capacity of the three government plants is over 27 million SWU/year and would cost industry about $10 billion dollars to build three new plants of similar capacity not including the cost of new power plants to supply the electric power.

Q. We have hear SWU's expressed as Kg SWU /yr or MT/SWU/yr; does this mean kg or MT of uranium?

A. The SWU carries units of weight since the amount of effort is proportioned to the quantity of material processed, but the SWU is not a material quantity itself. It is merely the amount of effort required to perform a given separation. The description of any separation job is stated in terms of the quantities of material fed to and withdrawn from the process and the isotopic assay of each of these flow streams. This information is combined, through a mathematical formula, into a single number which quantifies the separation job by a method of weighting the importance of each quantity and assay involved. The result is a measure of the isotopic separation effort involved and is, by definition, described in terms of "units of separative work".

Q. Do the depleted (tails) uranium have any use (value)?

A. The tails have potential fuel value since they can be transmuted into fissionable plutonium-239 by controlled neutron irradiation and will be a benefit in the Breeder Reactor.

Q. Why isn't all of the U-235 isotope separated from the natural uranium?

A. This is mainly a matter of economics and feasibility. There are optimum conditions of feed, power, and tails assay at which the lowest unit cost of a given product (enriched urnaium) is obtained. For example, for an enriched product with a given U-235 content, the amounts of separative work and of feed required vary according to the tails assay. The lower the tails assay, the less the requirements for feed and the greater the requirements for separative work per unit of product. Therefore, if the assays of feed and product are fixed, and the costs of feed and separative work are also fixed, the unit cost of product will vary

with the tails assay. This suggests that an optimum tails assay for which product cost is a minimum should be sought.

Q. Why are there more organizations interested in the gas centrifuge process than the gaseous diffusion process?

A. Each firm probably has its own reason; however, besides being a newer technology, the centrifuge process is less dependent on the availability of large amounts of electric power, economical centrifuge plants can be of much smaller size and the desired capacity can be achieved by combining the output of number of small modules. Consequently, small capacity increments can be added as required to closely follow market needs. All of this makes it easier to enter into the uranium enrichment business which is very capital intensive.

Q. What is the Centrifuge Enriching Program?

A. In August 1974 the Government announced a program expected to lead to several relatively small demonstration centrifuge enriching plants being built by private industry with considerable support from the Government. A new request for proposals for this program which extends and elaborates upon the earlier program will be issued soon. It is expected that it will result in several propositions for centrifuge enriching plants which will proceed more or less in parallel with each other and the UEA project. These plants would be expected to start out with capacities of 200-300 thousand SWU/year and expand to 2-3 million SWU/yr as additional capacity is needed.

Q. The UEA proposal is based on the gaseous diffusion process. Are there any other domestic firms interested in providing commercial enriching services based on the gas centrifuge process?

A. Yes. There are at least three organizations interested in undertaking private centrifuge enriching projects under the Centrifuge Enriching Program. (Centar, Exxon Nuclear, and Garrett)

Q. If private industry does not build centrifuge enriching plants under the Centrifuge Enriching Program would the Government go ahead and build one?

A. We expect that under the revised RFP private industry will build demonstration plants and that these will be expanded into full production plants. We have had extensive discussions with industry and have determined that at least three groups are interested in such an undertaking.

Q. If the UEA and a number of Centrifuge Enriching Plants all begin operation in the early 1980's is there a danger that there would be an over supply of enriching capacity at that time?

A. We don't think there will be. The demonstration plants will be rather small to begin with and would be expected to expand to track market demand. Also any excess capacity could be used to augment the government contingency stockpile of separative work. Actually getting a number of firms into the enriching business at the same time is very desirable in creating a competitive domestic enriching industry.

Q. If domestic customers are to be charged about $73/SWU by the UEA Project, what is the charge for foreign customers?

A. ?

Q. With the alternative uranium enrichment methods of gas centrifugation and laser being developed, why weren't any of these considered for the new plant?

A. It is a matter of economics and risk. Over 30 years of large scale gaseous diffusion operations and continuing process development has made the process a very reliable and economical means of uranium enrichment. Demonstration of the projected economics of the gas centrifuge process need yet to be accomplished before this process can be used without risk. The laser method is only in the basic research stage of development and it is too early to determine whether this process is technically or commercially feasible.

Q. How many people are required to operate a gaseous diffusion plant?

A. About 900-925 people are required to operate plants with capacities between 8.75 million SWU/yr. and 17.5 million SWU/yr., respectively. About 10% of the personnel will be professional (engineers, accountants, management specialists, supervision, etc.)

Q. How much feed and energy is required to produce a unit of enriched U?

A. This depends on the assay of the enriched product and on the assay of the depleted material. For example, to produce 1 kg of 2.8% enriched U-235 and fixing the tails assay at 0.3%, 6 kg of natural uranium feed and 8250 kwh of electrical imput (providing 3 SWU) are needed.

Q. How much cheaper is electricity produced by nuclear power plants as compared with fossil-fired stations?

A. In 1974, nuclear-produced electricity cost about 40% less per kilowatt-hour than that generated by fossil-burning plants, where costs include amortization of capital and other fixed charges as well as fuel and operating expenses. Basis: Survey of 21 utilities, conducted by Atomic Industrial Forum.

Q. When are we going to run out of uranium?

A. There is no pat answer to this question, because some of our uranium resources have not yet been discovered, and the total economically recoverable uranium resource level can only be estimated. However, it will be necessary to develop additional uranium reserves.

Q. What are the South Africans doing?

A. South Africa is going ahead with plans to build an uranium enrichment plant using a variation of the nozzle isotope separation process originally developed in Germany. A plant with a capacity of about 5 million SWU per year might be expected to begin operation in the mid-1980's.

Q. Are the French likely to take some of our market? The Russians?

A. The French and the Russians are expected to supply a portion of the world market for enriched uranium. The United States is also expected to supply a sizable portion of the foreign market. It is expected that U.S. enrichment suppliers will be in a favorable position to compete with foreign suppliers.

Q. Who will supply the present conditional enrichment contracts if these are cancelled due to NRC decision not to approve plutonium recycle in light water reactors?

A. Additional enrichment capacity would be needed to take care of customers whose conditional contracts were cancelled. ERDA will continue efforts to assure that new enrichment capacity is built on a timely schedule to meet the expanding U.S. demand for enriched uranium.