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DEPARTMENT OF STATE

Washington, D.C. 20520

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January 24, 1977

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*File PRM 15*

FROM: PM/NPO - Louis V. Nosenzo *[Signature]*

Attached is a possible approach to a general policy on foreign reprocessing which would supplement the ideas presented in an earlier paper on a general framework for negotiating US agreements for cooperation. Your comments would be appreciated.

Attachment:

As stated.

PM/NPO:LVNosenzo/ds  
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UNITED STATES DEPARTMENT OF STATE  
REVIEW AUTHORITY: WILLIAM J GEHRON  
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US Policy on Foreign Reprocessing

One of the key elements of the October 28 policy statement was the decision on reprocessing. Domestically, the decisions were:

--that the United States should no longer regard reprocessing of used nuclear fuel to produce plutonium as a necessary and inevitable step in the nuclear fuel cycle, and that we should pursue reprocessing and recycling in the future only if they are found to be consistent with our international objectives;"

--to ensure that our domestic policies and programs are compatible with our international position on reprocessing by deferring the commercialization of chemical reprocessing;

-- to define a reprocessing and recycle evaluation program;

-- to investigate alternatives to reprocessing and to accelerate programs for nuclear waste management, including a federally owned repository for long-term storage of nuclear wastes; and

-- to promptly expand fuel storage to assure US utilities that there need not be concerned about shut-down of reactors because of limited spent fuel storage.

Internationally, the statement calls for:

-- a moratorium of at least three years on sensitive transfers;

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-- nuclear suppliers to provide nuclear consumers with fuel services, instead of sensitive technology or facilities;

-- other nations to participate in designing and carrying out a reprocessing and recycle evaluation program; and

-- international discussions concerning establishing a few centrally located, multinational controlled waste repositories.

With regard to US recipients, in particular, the decisions were:

-- to favor recipient nations that are prepared to forego, or postpone for a substantial period the establishment of national reprocessing or enrichment activities or, in certain cases, prepared to shape and schedule their reprocessing and enrichment facilities to foster non-proliferation needs; and

-- where appropriate, to provide consumer nations with either fresh, low enriched uranium fuel or make other equitable arrangements in return for mutual agreement on the disposition of spent fuel where such disposition demonstrably fosters our common and cooperative non-proliferation objectives.

#### General Considerations

The above policy which was designed in part to support our call for restraint in sensitive transfers in fact

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implies a much tougher US policy on reprocessing, beyond simply the denial of sensitive transfers to developing countries and to sensitive areas. It implies a go slow attitude by the US toward a reprocessing/plutonium economy and a desire to have other key industrialized states follow a similar course.

While over time we have successfully convinced other suppliers of the need to stop the transfer of sensitive facilities and technology and the need to control access to plutonium, our new negative attitude toward reprocessing and recycling has taken these same countries by surprise. In particular, Japan, the EC countries and its neighbors such as Sweden, Spain, and Switzerland have based their nuclear energy plans on reprocessing, both in the near term to compensate for limited spent fuel storage capacity and in the long term to permit transition to breeder reactors as high grade uranium ore reserves become depleted.

Many of these countries are considerably more dependent on nuclear energy than the US and unlike the US have no acceptable energy alternative. Thus, the new US attitude reflecting the need to reevaluate reprocessing and recycling more than any other US non-proliferation initiative is perceived as affecting the heart of their energy programs and plans. It has therefore met with considerable disagreement and apprehension by other countries, both in terms of their role as a supplier of services

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(e.g., the UK and France through United Reprocessors) and as key recipients of US supply (e.g., the EC and Japan).

\* This is not to say that we should change our basic approach of taking, or urging others to take a more reasoned look at reprocessing and alternatives to reprocessing, before prematurely plunging into a reprocessing/plutonium economy. Rather, it suggests that we take fully into account the current energy needs and the future energy plans of other key countries in formulating the US approach to minimizing proliferation risks associated with foreign reprocessing, recycle and breeder programs. In this regard, the recent US decision to allow specific shipments of US supplied spent fuel from Japan, Switzerland, and Spain to be reprocessed in the UK and France (with recovered plutonium to be retained by these nuclear weapon states) was important. This decision process served to clearly signal high level US concern over reprocessing, while at the same time allaying concerns of the countries involved that the US would implement its new policy direction without regard to its affect on recipients.

#### US Policy Rationale

The revised US policy on reprocessing and recycling outlined in the October statement flowed from a reassessment of the non-proliferation risks associated with the move toward a plutonium economy <sup>and</sup> the recognition that there had been insufficient study of how to minimize these risks

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including possible alternatives to a plutonium economy.

In addition, the move toward reprocessing is being driven by questionable economics. Since the October statement a number of countries, e.g., Japan and Sweden have asked for the rationale for our decision since there experts had reached different conclusions. We have informally responded to these inquiries along the following lines.

Non-Proliferation Risks: The popular assumption prior to two years ago was that sensitive operations like enrichment and reprocessing can be carried on safely under international safeguards and are therefore "safeguardable." We have questioned this premise, arguing that while we are obviously concerned about diversion, the greater concern is withdrawal from or <sup>abrogation</sup> of safeguards agreements and political commitments and also terrorist action which no system of technical safeguards can prevent. This argues for minimizing the number of such facilities and locating them in countries under political, economic, and physical protection arrangements that maximize disincentives for abrogation and opportunity for successful terrorist action. We have therefore strongly discouraged acquisition of addition sensitive facilities under national control, advocated a moratorium on such transfers, urged use of existing services and encouraged study of future ways to minimize risk, such as a multinational framework for sensitive facilities involving supplier countries with constraints on technology transfer.

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With regard to the "need" for early reprocessing, three arguments are generally used as justification:

Economics: Reprocessing of spent fuel allows recovery of plutonium and uranium which can be recycled to yield economic benefits. Our response has been that our recent studies indicate that the current economics in fact favor storage of spent fuel and purchase of new LEU fuel rather than reprocessing and recycle of spent fuel. While the relative cost comparison could change as the cost of uranium fuel and enrichment services goes up (some projections indicate a cross-over in the early to mid 80's), it should be remembered that commercial reprocessing and recycling costs are paper estimates compared to real costs for enrichment and feed. Thus, it is unrealistic to assume that these cost estimates carry the same significance or that the same forces driving up the cost of LEU will not operate to drive up the cost of reprocessing and recycle. In any event, reprocessing and recycle are not cost effective now.

Environmental and Storage Problems: A second argument for reprocessing which has been strongly put forth by the various US recipients and the French, Germans, Japanese, and Swedes, in particular, is the environmental problems and storage problems associated with spent fuel storage. They argue that, unlike the US, they have limited area

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available for storage under conditions that would be environmentally acceptable and that reprocessing allows separation of high level waste (a few percent of the total spent fuel assembly) from low level waste (the bulk of the assembly). The bulky low level waste can be disposed of with minimum environmental problems (e.g., buried) while the low volume high level waste can be stored in special depositories. In response, we have argued that this is in fact another aspect of the economic argument. Our studies indicate that it is cheaper to build additional pool storage for spent fuel under environmentally acceptable conditions than to reprocess. Space limitations are a real problem only for countries like Luxemburg. If you can bury the low level waste from reprocessing you can build capacity for the original spent fuel assemblies. In addition, the long-term environmental advantages of separating waste are not at all clear since spent fuel in its original inert and less concentrated form decays to about the radioactivity levels of uranium ore after about 300 years. The high level waste from present reprocessing methods will require 250,000 years to decay to this level.

Breeder Requirements: The third argument advanced to support reprocessing is the centrality of reprocessing to breeder reactors, the logical and necessary follow-on to current LWRs. In addition, successful transition to plutonium breeders will require stores of plutonium, obtainable,

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from reprocessing LWR fuel. Our response has been that breeders are ten to fifteen years in the future and that it is not clear that plutonium breeders are the only viable alternative for future power generation. In fact the serious non-proliferation and physical protection risks associated with the plutonium breeder/MOX fuel concept dictate a go slow approach while we examine ways to make the cycle safer and/or pursue alternative concepts that better serve our non-proliferation objectives. For example, the concept of a few mixed thorium/uranium breeders providing LEU (rather than MOX) fuel to a large system of LWR reactors represents an attractive alternative because of its obvious non-proliferation and physical security advantages and the utilization of thorium with world reserves many times greater than uranium.

With regard to the assertion that stockpiles of plutonium are needed early to support experimental breeder programs as well as for commercial breeder operations, the counter to this is that experimental breeders currently utilize U235 rather than plutonium for start-up and this will probably also be true of commercial breeder start-up operations. Thus, there is little need to stockpile plutonium now for breeder operations.

While we have made these arguments verbally to some, there is a strong need for a US position paper presenting the above rationale with supporting analysis. This would be of value, for example, with other governments in the

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nuclear suppliers context and more generally with regard to US recipients for use by sympathetic foreign ministries attempting to cope effectively with their ministries of energy, of technology and of economics.

#### US Policy toward Recipients

While the above line of reasoning should serve to convince some of the rationality of the US position, how we formulate this policy vis-a-vis recipients in new agreements and in renegotiations, is of paramount importance. If the policy is to be useful, as stated in an earlier PM paper on renegotiation of agreements, it must apply generally; any exceptions will make the policy increasingly difficult to apply. In addition, it must take into account the energy needs, programs and plans of US recipients and other suppliers so as not to place them at a serious economic disadvantage. Our goal should be to formulate realistic requirements for implementation so as to allow a reasonable chance of approaching our non-proliferation objectives with respect to all US recipients, with few if any exceptions.

One approach that has such potential is the following. The US would seek in new agreements and through renegotiation of existing agreements to universally require US consent for reprocessing of US supplied fuel or fuel processed in US reactors with the following understanding in the near term.

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-- The US would seek to work with each US recipient to attempt to solve its spent fuel disposal problem through various techniques such as improved racks for more efficient storage and constructing additional spent fuel storage capacity.

-- As a fallback procedure, in cases where additional domestic storage is not available on a time basis or where economic penalties to recipients would be severe, we would either permit transfer for reprocessing but only in nuclear weapon states, e.g., the UK, and France or transfer for international storage, if and when such a regime is established, with US right of approval over subsequent alteration. If material is reprocessed, removed plutonium would be retained by these nuclear weapon states with retransfer subject to US approval.

-- Alternatively, where domestic storage is not available on a timely basis we would have the option to acquire the spent fuel for transport from the recipient to a place of US choosing under financial arrangements similar to those assuming commercial reprocessing in the UK or France.

Over the longer term, if our evaluation program should indicate the acceptability of commercialization of reprocessing, we would then:

-- generally sanction reprocessing in nuclear weapon states, again with retention of recovered plutonium by the nuclear weapon states and with retransfer subject to US approval, and

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-- possible permit reprocessing in a few safe locations (or groups of NNWS, e.g., the EC) in NNWS/with strong commitments to non-proliferation (e.g., NPT) and extensive dependence on nuclear power (e.g., 50 reactors), provided there is direct involvement of a nuclear weapons state in the reprocessing operation and with recovered plutonium under the custody of the nuclear weapons state (such locations might be Japan and possibly Europe).

The restriction of reprocessing in the near term to nuclear weapon states and in the longer term, if reprocessing <sup>to</sup> proves to be necessary, /a few additional locations in non-nuclear weapon states, but with direct nuclear weapon state involvement, attempts to solve the problem of "safeguardability" of reprocessing. The non-proliferation commitment, justifiable / energy needs, and the direct involvement of a nuclear weapon state should ensure against diversion and abrogation. In addition, the placement of strategic amounts of recovered plutonium under custody of the nuclear weapon states attempts to make this situation with regard to weapons-usable material directly analogous to US forward deployed nuclear weapon dispositions. For example, in Europe, US weapons storage facilities are always under direct US custody, but perimeter security forces are generally under host country control. This treatment is therefore consistent with the concept that access to strategic amounts of weapons-usable material is equivalent to access to nuclear explosives. In addition, storage of plutonium under nuclear weapon state custody with US approval required for retransfer is in many

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ways preferable to international control (e.g., as provided for under Article 12 of the IAEA statute) where necessary negotiation and approval of release conditions by the IAEA membership could result in less than adequate release conditions in the US view.). However, the question of custody could be left flexible to permit the possibility of international control at US choice in the future.

#### Spent Fuel Storage

The above approach attempts in the near term to slow down the general move toward early reprocessing by working with recipients to solve their spent fuel storage problems but without creating economic difficulties for them. Clearly, the success of this policy aspect will depend on our ability to solve their storage problems economically and on a timely basis. The recent urgent requests by Japan, Spain and Switzerland in fact may foreshadow a significant storage problem for US recipients. We and ERDA need to determine as soon as possible, through direct requests to recipients and through available information, the extent of the problem we may be facing. We will need to focus US capabilities and resources to attempt to cope with it.

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### Japanese Reprocessing Plans

In addition to storage problems, other aspects of the nuclear programs of certain US recipients present difficulties. The Japanese plans to put their experimental reprocessing facility at Tokai into operation this spring is such a situation. They are currently requesting a US safeguardability determination on Tokai to permit a hot run in May of 1977. Clearly, the US cannot make an affirmative determination at this time in view of its own policy decision to reevaluate reprocessing and recycle. However, use of Tokai as a joint US/Japanese test bed for evaluating reprocessing would be consistent with both the above export policy and the US policy statement. Such a joint experiment would be a logical step toward implementing the policy initiative to evaluate reprocessing and waste management and also to include other countries in these experiments consistent with US non-proliferation objectives. It would be consistent with the export policy outlined above since reprocessing experiments would take place in a NNWS under identical conditions specified for a possible future commercial reprocessing center, i.e., a state with a significant commitment to non-proliferation, a major nuclear energy program (over 30 reactors by 1980) and with direct involvement of a nuclear weapons state (the US). It would be understood that strategic quantities of

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produced plutonium would be placed under US custody. This combination of conditions should ensure the continued safeguardability of the experimental operation.

The Japanese are also beginning planning of a large scale commercial reprocessing plant to handle the future spent fuel problems. We will need to convince them to delay these plans pending the results of the US evaluation program. Joint US/Japanese involvement in Tokai would show a US desire to take Japanese energy needs and programs into consideration in US planning and should make acceptance of a delay or reorientation of their follow-on reprocessing plans considerably more palatable. It also would be visible evidence of the special relationship between our two countries in the civil nuclear energy area.

The Japanese have asked for bilateral talks last fall and winter to discuss Japanese plans for reprocessing, to learn US attitudes in detail and to jointly explore ways to satisfy Japanese energy needs consistent with common non-proliferation objectives. We have hesitated to do so, first because of the Ford policy review and later because of the change in Administration. However, we need to respond as soon as our policy is sufficiently formulated to allow meaningful discussion of US/Japanese planning.

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India

The above policy is also readily adaptable to Tarapur. We are currently faced with a situation of either approving the reprocessing of spent fuel at Preferre or finding alternative ways to dispose of the spent fuel from Tarapur (this is addressed in detail in a paper being prepared by NEA on the subject). The lending contenders for such disposition is either US buyback as provided for in the US/India bilateral arrangement or to rerack the fuel for more efficient storage. ERDA preliminary analysis indicates the first alternative is expensive, that casks to move the fuel are in short supply, and the operation to take care of current spent fuel inventories would take many years. The second alternative appears to be a reasonable short term fix. A third possibility which the above policy would offer would be transfer to the UK or France for reprocessing but with recovered plutonium withheld.

The solution to the problem also hinges on whether our intent is to continue to provide nuclear fuel to Tarapur. Assuming that our goal is to attempt to bring India back into the fold as a responsible nation, a previous<sup>PM</sup> paper outlined a general concept for getting the Indians as well as Israel and South Africa to place their existing unsafeguarded facilities under safeguards. One possible additional incentive to the Indians to accept such a regime would be to offer them the opportunity for a joint US/Indian experimental program at Preferre to do tandem fuel fabrication (rather

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than reprocessing) as part of the overall US evaluating program of alternatives to reprocessing. India with its mix of LWRs and CANDU reactors is an ideal test bed for such a concept. In addition, the utilization of Prefere which the US has refused to certify as safeguardable and which therefore will not otherwise be utilized could remove a significant source of embarrassment to the India AEC. Thus, such a proposal, as a quid for putting all facilities under safe-possibly in the long-guards, should be attractive both in the short term to utilize Prefere and/term to help solve India's reactor fueling and spent fuel disposal problems.

Nuclear Weapon States:

The UK, France, and Soviet Union

The above policy of using reprocessing in the UK and France as a stop-gap to handle near-term spent fuel storage problems should not raise particular difficulty with either the UK or France as member of United Reprocessors or with the new French policy to supply services instead of sensitive technologies. There appear to be sufficient storage problems in recipient countries and reprocessing startup and expansion problems in the UK and France so that the US go slow policy on reprocessing should not present a real commercial problem in the near term.

The concept of physical custody of recovered plutonium by the nuclear weapons state should also present no problem and in fact parallels the ideas put forth by the British

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at the nuclear suppliers meeting on international storage, that recovered plutonium should be stored near the reprocessing site and the reprocessing state should maintain physical control over storage.

The difficulty with the UK and France will arise more over the philosophy of the US policy and what it portends for the future than the near-term implications. The UK sees reprocessing services as its major nuclear export. France, on the other hand, has just changed its policy at US urging, from one of sensitive transfers to one of supplying services. They as well as others will feel that US objection to, or denial of possible reprocessing services in safe locations like nuclear weapon states is not responsive to the needs of other countries with much greater dependence on nuclear energy than the US. In addition, in the particular case of France, much of their future planning for domestic power generation and reactor exports has centered around their plutonium breeder development. The new US policy is seen as a threat to these plans. We will, therefore need to consult and work very closely with France as our policy and evaluation programs progress in order to ensure that we take account of their concerns and jointly shape future programs to balance energy needs and non-proliferation risks. In particular, we should attempt to significantly expand our joint cooperation on breeder development, perhaps in the context of our current evaluation program, to try to shape

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breeder development toward cycles that better meet our non-proliferation objectives. US financial involvement in these programs should serve to relieve pressure for French breeder exports to finance their internal programs.

Use of the Soviet Union for reprocessing US fuel would present a large national security issue and in any event is probably unnecessary. On the other hand, the Soviet Union currently provides in all of its agreements with its recipients (i.e., Eastern European countries) for reprocessing only in the Soviet Union. Thus, the proposed US policy would be consistent with Soviet policy. The retention of recovered plutonium in nuclear weapons state under physical control of these states is also consistent with Soviet policy.

#### The EC

The primary difficulties with the above policy will be within the EC community. Currently the US/EC agreement does not require the community to seek US approval for reprocessing or internal storage, movement or use of plutonium within the community. Although no large reprocessing efforts<sup>exists</sup>/outside of the UK and France, there are ongoing pilot operations in a number of states, with plans for commercial operations. For example, the FRG has joined the UK and France in United Reprocessors. It apparently doesn't intend to reprocess foreign fuel but does have plans for a plant for domestic use. Belgium and Italy have similar plans for national reprocessing. In addition, like the

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French, many of these states believe the future of nuclear power is the plutonium breeder and therefore any policies that would deny them access to stockpiles of plutonium represent a threat to their future energy independence. For these reasons and in view of the significant risk of endangering broader security and political relationships with our European Allies, we will need to move carefully in implementing any new policy on reprocessing of US fuel in the EC. One possibility is to attempt to integrate the EC community into the US evaluation program, perhaps through a US/EC joint experimental reprocessing effort in Europe, similar to or complementary to the proposed Tokai program. The EC, as a whole, would qualify in the same sense as Japan with its significant commitment to non-proliferation (all NPT parties) and its large dependence on nuclear energy (approximately 40 reactors by 1980 excluding France and the UK). This would need to be explored in detail before we attempted any renegotiation of the US/EC agreement in order to implement the proposed reprocessing policy.

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