

Cooperative Verified  
Dismantlement of a Gas  
Centrifuge Program

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# Dismantling a Gas Centrifuge Program

- The issue of verified dismantlement of a gas centrifuge program remains a key issue on the Korean peninsula. North Korea is reported to have a secret centrifuge program that is within a few years of making significant quantities of highly enriched uranium.
- For the purposes of dismantlement, a gas centrifuge program must be defined broadly.

# Verification Organization

- A reasonable candidate for the verification organization is “IAEA Plus,” or the IAEA safeguards department supplemented by gas centrifuge experts from the United States, Russia, Urenco countries, and perhaps Japan.
- The organization will need a core staff of about 10 specialists and key support personnel;
- The expected budget is about \$5-10 million.

# Verification Organization: Rights and Information

- This organization will need extensive rights, including access “anywhere, anytime, and any place within reason,” access to documents, including program documents and procurement data, the ability to interview program staff and officials, and the right to take environmental samples at declared sites and elsewhere.
- This organization will need access to centrifuge and centrifuge-related procurement information from the state and IAEA member states.

# Step-by-Step Dismantlement of a Gas Centrifuge Program

- The following slides outline a series of steps involved in verifiably dismantling a gas centrifuge program where dismantlement and verification occur concurrently.
- These steps describe such a process, although the actual steps may differ in practice.
- Many details of these steps need to be developed before they could be implemented in an actual situation.

# Initial Meetings of the State and the Verification Organization

- A series of high-level technical discussions between the state and the verification organization.
- The meetings would discuss the joint process of verifiable dismantlement and seek agreement on a schedule and a set of general procedures to carry out the dismantlement process.
- The meetings should also seek to identify problems requiring additional political decisions.

# Joint Tour of Main Facilities in the Centrifuge Program

- A tour to familiarize experts from the verification organization with the gas centrifuge program.
- The focus would be on visits to the main centrifuge sites, including the research, development, testing, and manufacturing facilities and any sites with operational centrifuges.
- During these visits, the verification organization's experts would gain a familiarity with the state's design, development, testing, and production of centrifuges.

# State's Declaration of Centrifuge Program

- The state produces a comprehensive declaration of its gas centrifuge program, reflecting initial discussions with the verification organization and the tour of the facilities.
- The declaration should include details of centrifuge design, development, procurement, production, and operation. It needs to include a history of the program with a chronology of major political and technical milestones of the program. It should also list major future goals and timelines.



# An Agreed Understanding of the Centrifuge Program

- The verification organization must develop a coherent technical understanding of the centrifuge program in close consultation with the state.
- The verification organization needs to understand, in close consultation with the state, the origin, scope, and timing of the program.
- This understanding should be based on a detailed study of the declaration, a review of documents, and discussions with program officials, scientists, and technicians.

# State Plan for Dismantlement

- The state should develop a comprehensive plan to dismantle its program.
- The government may form a senior experts' committee to investigate methods to dismantle the program and draw up a schedule.
- The state should develop its plans in consultation with the verification organization.

# Verification Organization's Plan

- The verification organization must develop its own plan in consultation with the state to verify the program's dismantlement.
- It must identify actions necessary to take in order to achieve effective and timely verification.
- This plan must include detailed methods to ensure that items are destroyed or converted and that secret centrifuge activities or capabilities are unlikely to exist.

# Joint Agreement of a Plan to Dismantle the Program

- The state and verification organization need to agree on a plan to verifiably dismantle the program that incorporates the above plans and concerns of each party.
- Key agreements would include the exact items subject to destruction, conversion, or on-going monitoring.
- Careful records of dismantlement activities would be developed and maintained by both parties.

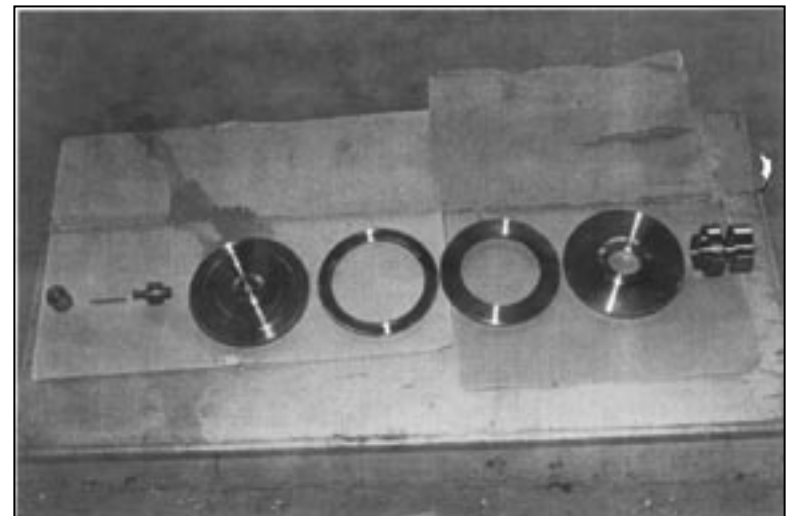
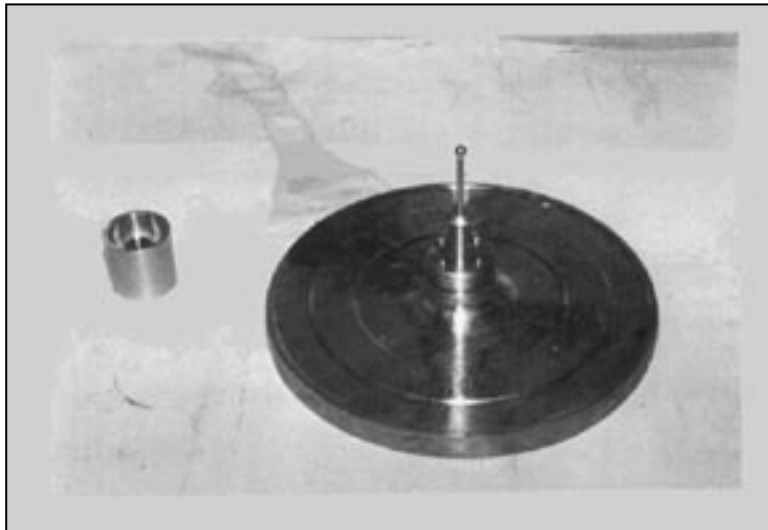
# Dismantlement of Program

- Based on the joint plan, the state would dismantle the program and convert equipment and materials to other, non-proscribed uses.
- Many items would need to be destroyed; others would be converted to other uses.
- Buildings or facilities would not, in general, be subject to destruction.

# Examples of Items Destroyed- Key Centrifuge Components

- Included in this destruction plan would be whole centrifuges, major centrifuge components, and cascade equipment.
- Destruction is accomplished by smashing, cutting, or other methods to disable the item against future use.

# Key Centrifuge Components



# Examples of Items Rendered Unusable-Key Manufacturing Equipment

- Certain centrifuge manufacturing equipment may be rendered unusable for future use in a centrifuge program.
- Rendering a machine tool unusable may involve destroying special fixtures or computer programs produced to enable the machine to make centrifuge components.



# Key Manufacturing Equipment

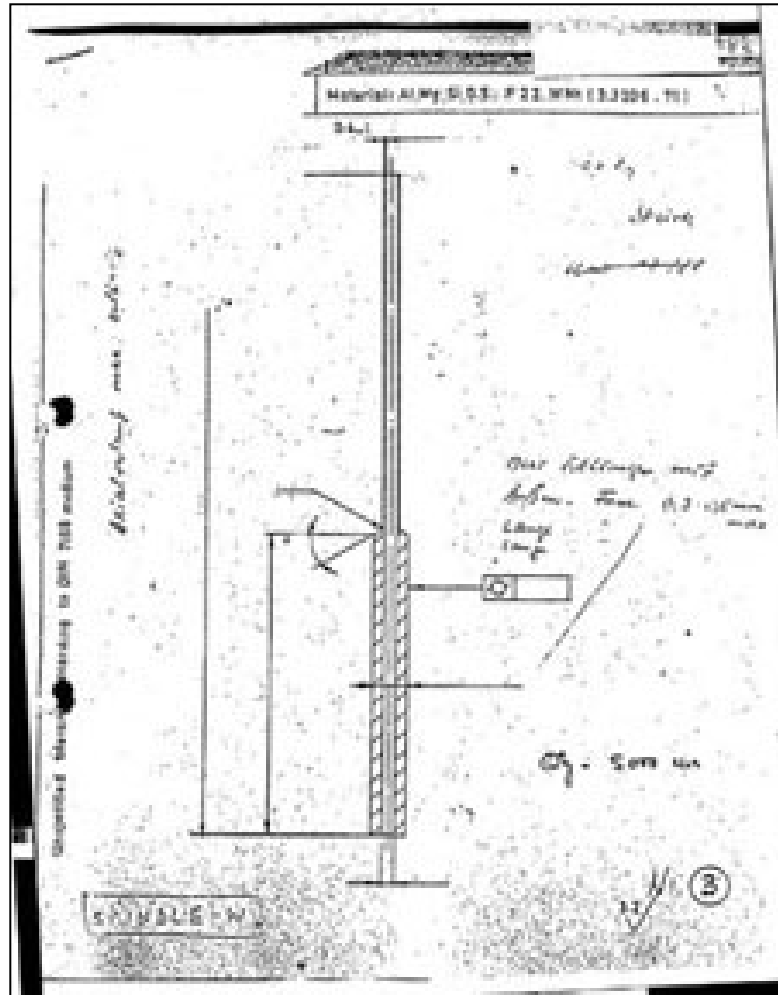


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# Examples of Records Destroyed

- Designs, documents, and blueprints may also need to be destroyed.
- The destruction method may involve burning.
- Although ensuring the destruction of all records is impossible, such a step nonetheless helps develop confidence that the state intends to comply.

# Sensitive Records



# Activities of Verification Organization

- The verification organization would witness the entire process of dismantlement and conversion.
- It would implement the agreed upon program to verify the dismantlement of the program.
- It will need to ensure that the state is not hiding portions of its centrifuge program by using its rights and possibly conducting inspections throughout the country. Procurement information from both the state and supplier states may be critical in reaching a final determination.

# Verifying the Production of Any Enriched Uranium

- The verification process would focus on ensuring the accuracy and completeness of any state statement about the production of enriched uranium in the centrifuge program. It would use internationally accepted methods, including material balance and accounting procedures and environmental sampling, to verify any declaration.

# Verifying the Production of Any Enriched Uranium (cont.)

- Three cases would need to be considered.
- The first case is no enriched uranium was produced.
- The second case is the production of a small quantity consistent with research and development activities.
- The third case is the production of larger amounts of enriched uranium. Verification activities in this case could be more complicated and take significantly longer than in the other two cases.

# Converting Program to Non-Centrifuge Use

- Certain facilities, equipment, or materials would be converted to alternate, allowed uses.
- An immediate purpose would be to continue to employ program personnel in productive work.
- The priority would be to create economically viable programs or joint ventures.
- For example, clean-room facilities could be converted to other, allowed high technology uses.
- Machine tools could be assigned other industrial uses.

# On-Going Monitoring

- On-going monitoring of certain non-nuclear activities may be necessary.
- Nuclear material will require on-going monitoring.
- The IAEA would be the most logical choice to conduct on-going monitoring.



# Verification Organization's Conclusion

- At the end of the agreed process, the verification organization would reach and announce a conclusion that the program has been dismantled and secret centrifuge activities are unlikely to exist.
- The organization would also state that on-going monitoring has been successfully implemented.