

**GAO**

Report to the Chairman, Committee on  
Energy and Natural Resources,  
U.S. Senate

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June 1997

**NUCLEAR  
NONPROLIFERATION**

**Implementation of the  
U.S./North Korean  
Agreed Framework on  
Nuclear Issues**



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**Resources, Community, and  
Economic Development Division**

B-276968

June 2, 1997

The Honorable Frank H. Murkowski  
Chairman, Committee on  
Energy and Natural Resources  
United States Senate

Dear Mr. Chairman:

On October 21, 1994, the United States and North Korea concluded an agreement known as the Agreed Framework to address the threat posed by North Korea's nuclear program and to diffuse tensions on the Korean Peninsula.<sup>1</sup> Under the Agreed Framework, the United States is helping North Korea acquire two light-water nuclear power reactors and interim supplies of heavy fuel oil in exchange for a freeze on North Korea's existing nuclear facilities and North Korea's promise to eventually dismantle the facilities and comply with its obligations under the Nuclear Nonproliferation Treaty. Over time, the Agreed Framework specifies that the United States and North Korea will work towards full normalization of their political and economic relations and peace and security on the Korean Peninsula.

This is our second report in response to your request that we review issues related to the implementation of the Agreed Framework.<sup>2</sup> This report discusses (1) U.S. costs to implement the Agreed Framework; (2) options for disposing of North Korea's existing spent (used) fuel; (3) the contracting for the light-water reactors and other goods and services; (4) the status of actions to normalize economic and political relations between the United States and North Korea; and (5) the status of actions to promote peace and security on the Korean Peninsula. Appendix VI of this report also discusses U.S. humanitarian assistance to North Korea.

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**Results in Brief**

As of April 1, 1997, the United States had approved about \$82 million in funding to implement the Agreed Framework. The total cost to the United

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<sup>1</sup>"Agreed Framework Between the United States of America and the Democratic People's Republic of Korea." The Democratic People's Republic of Korea is commonly known as North Korea.

<sup>2</sup>Our first report, *Nuclear Nonproliferation: Implications of the U.S./North Korean Agreement on Nuclear Issues* (GAO/RCED/NSIAD-97-8, Oct. 1, 1996), addressed whether (1) the Agreed Framework is a nonbinding political agreement, (2) the United States could be held financially liable for a nuclear accident at the North Korean reactor site, (3) North Korea has obligated itself to pay the cost of upgrading its existing electricity power distribution system, and (4) the agreement is being implemented consistent with the applicable laws governing the transfer of U.S. nuclear components, materials, and technology.

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States is unknown but is expected to reach tens of millions of dollars. South Korea and Japan are expected to provide the majority of the estimated \$4 billion needed to construct the two light-water reactors.

The removal of North Korea's 50,000 kilograms of spent nuclear reactor fuel is expected to begin in about 4 to 7 years. North Korea's spent fuel could either be reprocessed and stored or stored without reprocessing until a deep underground repository is available for the fuel's permanent disposal.

The international organization created to implement portions of the Agreed Framework has developed draft guidelines for contracting for services needed to carry out the agreement. Details about how the organization's prime contractor will procure goods and services for the reactors' construction will not be known until the contract is finalized.

As specified in the Agreed Framework, the United States has taken steps to normalize its economic and political relations with North Korea. Further progress will depend on addressing issues of concern to the United States, such as the return of the remains of U.S. soldiers missing in action from the Korean War. Progress on issues of concern has been limited.

The United States expects that improved relations between the two Koreas will contribute to peace and security on the Korean Peninsula. In April 1996, the United States and South Korea invited North Korea to participate in peace talks. While North Korea accepted the talks "in principle," there has been no agreement about the timing of the talks or the steps needed to initiate them.

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## Costs to Implement the Agreed Framework

Shortly after the signing of the Agreed Framework, the U.S. State Department estimated that U.S. contributions to the Korean Peninsula Energy Development Organization (KEDO)<sup>3</sup>—the international organization created to implement portions of the agreement—would likely be between \$20 million and \$30 million annually. State further estimated that the total cost to implement the agreement would be tens of millions of dollars. As of April 1, 1997, the United States had approved about \$82 million in funding to implement the Agreed Framework, including \$51 million in contributions to KEDO. The United States had also provided about

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<sup>3</sup>KEDO was formed by the United States, South Korea, and Japan. At the conclusion of our review, seven other countries—Argentina, Australia, Canada, Chile, Finland, Indonesia, and New Zealand—had joined KEDO. Efforts continue to recruit additional members.

\$31 million in other funding, including about \$26 million to the Department of Energy to assist North Korea in safely storing spent fuel from North Korea's 5-megawatt electric reactor, pending the removal of the fuel from North Korea. South Korea and Japan are expected to pay the majority of the estimated \$4 billion for the reactors. As of April 1, 1997, these countries had contributed about \$38 million, including \$9 million for site survey and other preconstruction work and about \$10 million for KEDO's administrative expenses. The remaining \$19 million represents collateral for securing loans for the heavy fuel oil purchases.

The total amount of future U.S. expenditures is not known, in part, because of uncertainties about the amounts that other countries will contribute to KEDO. Also, reliable estimates of some major costs, such as the costs of disposing of North Korea's spent fuel and of dismantling North Korea's existing nuclear facilities, are not yet available. While the existing estimates are highly speculative, the two activities are expected to cost hundreds of millions of dollars. None of the agreements concluded to date obligates the United States, KEDO, or North Korea to pay the costs of disposal or dismantlement. (App. I provides information on cost estimates to fully implement the Agreed Framework, including the portion of these costs expected to be paid by the United States.)

## Options for Disposing of North Korea's Spent Nuclear Reactor Fuel

North Korea has about 50,000 kilograms of spent fuel from a small reactor that had been operating before the freeze on North Korea's nuclear program. The spent fuel contains about 25 kilograms of plutonium that could be used to produce nuclear weapons. To address this threat, the United States and North Korea agreed to safely dispose of the fuel in a manner that does not involve reprocessing in North Korea. The removal of the fuel is expected to begin in about 4 to 7 years—when key nuclear components for the first light-water reactor are delivered—and conclude when the reactor is completed.

There are two options for dealing with North Korea's spent fuel. One option is to reprocess the fuel in a country other than North Korea and to store the resulting high-level waste until it can be disposed of properly. The other option is to package and store the fuel for an interim period before its final disposal. Governments around the world support the use of deep underground repositories as the best method for the final disposal of highly radioactive waste, but no country has yet built such a facility. (App. II provides information about the options for interim and final disposal,

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including information about who will be involved in making the decision about disposal and when the decision is expected to be made.)

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## Contracting Arrangements and Actions Arising From the Agreed Framework

According to KEDO, its draft procurement guidelines are based on the contracting policies and practices of U.S. government and commercial concerns. As of April 1, 1997, KEDO had contracted for a wide range of services, including legal, banking, and architectural and engineering services to carry out the Agreed Framework. KEDO had also contracted for the supply of heavy fuel oil and for the purchase, delivery, installation, and maintenance of meters and recorders to monitor the flow of the heavy fuel oil at six North Korean power plants where the oil is consumed.

According to KEDO, its contract with the Korea Electric Power Corporation for the construction of the reactors—the prime contractor—is the largest contract KEDO will award, both in terms of complexity and price. While negotiations are ongoing, KEDO does not expect the contract will be executed until 1998. Details about the prime contractor's subcontracting will not be known until the prime contract is finalized. (App. III provides information about KEDO's contracting, including the model KEDO and the prime contractor are using to develop their contract.)

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## Status of Actions to Normalize Economic and Political Relations Between the United States and North Korea

In January 1995, the United States announced several steps to ease economic sanctions against North Korea, including the lifting of a ban on telephone and telecommunications services between the countries. The United States does not intend to relax its trade restrictions further until progress is made on issues of concern to the United States. Regarding political relations, in December 1994, the United States and North Korea negotiated a draft agreement to exchange liaison offices—the lowest level of diplomatic representation. The Department of State declined to provide us with information about the status of the negotiations or the expected time frame for opening the offices.

The Agreed Framework also contemplates that diplomatic relations will be upgraded as progress is made on numerous bilateral issues, including the return of the remains of U.S. soldiers missing in action from the Korean War. Thus far, limited progress has been made in addressing these concerns. For example, as a result of the first joint U.S./North Korean recovery mission, one American soldier was recovered, returned to the United States, and positively identified. The United States paid the cost of the recovery mission, including about \$96,000 in compensation to North

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Korea. In May 1997, North Korea agreed “in principle” to allow the United States to examine North Korea’s war archives and to conduct three joint recovery missions in 1997. (App. IV provides information about actions to normalize political and economic relations between the United States and North Korea, issues of concern to the parties, and, where applicable, actions taken to resolve the U.S. concerns.)

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## Status of Actions to Promote Peace and Security on a Nuclear-Free Korean Peninsula

A key element of the Agreed Framework, which was included at the United States’ insistence, is the expectation that relations between the two Koreas will improve and contribute to peace and security on the Korean Peninsula. On April 16, 1996, the United States and South Korea proposed a “Four Party Meeting” of representatives from South Korea, North Korea, the United States, and the People’s Republic of China. The purpose of the meeting is to replace the 1953 military armistice agreement—which ended the hostilities of the Korean War—with a permanent peace accord.

In March 1997, a delegation of U.S. and South Korean officials met in New York City to brief North Korean officials about the proposed peace talks. Two working-level meetings were held in the following weeks, and in April the North Korean delegation accepted in principle the four-way talks. At the conclusion of our review, agreement had not been reached about the timing of the talks or the steps needed to initiate them. (App. V provides information about efforts to improve the peace and security of the Korean Peninsula, including U.S. assurances to North Korea on the threat or use of nuclear weapons and North Korean steps to implement its 1992 declaration with South Korea on the denuclearization of the Korean Peninsula.)

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## Observations

The total amount of future U.S. expenditures to fully implement the Agreed Framework is unknown because reliable estimates of the agreement’s total cost are not available. In our opinion, this, together with uncertainties regarding the amounts that other governments intend to contribute to KEDO, raises questions about the extent to which the United States—as both a party to the Agreed Framework and a founder of KEDO—could be called upon to finance activities arising from the Agreed Framework. This issue is particularly important with respect to the required heavy fuel oil purchases for North Korea, since at the conclusion of our review KEDO had purchased less than 20 percent of the oil required to be delivered to North Korea by October 20, 1997, and did not have sufficient funds to pay for the remainder.

Uncertainties also exist about who will pay for costly future activities, including (1) the removal and disposal of North Korea's spent nuclear reactor fuel and (2) the dismantlement of North Korea's existing nuclear facilities. While existing estimates are speculative, these activities could cost hundreds of millions of dollars. The United States, KEDO, and North Korea are not obligated to pay these costs and, thus far, none of the parties has committed to do so. Nevertheless, as the Department of Energy's \$25.8 million effort to safely store North Korea's spent fuel demonstrates, the United States may need to contribute substantial funds to carry out the Agreed Framework or face the agreement's collapse, if the international community does not contribute adequate funding.

The model being used to develop the prime contract between KEDO and the Korea Electric Power Corporation for the construction of the two light-water reactors provides recommended text and suggested modifications for developing the prime contract. The model addresses major contracting issues and, if properly tailored to the parties' circumstances, should protect KEDO's interests. However, the adequacy of the prime contract will depend on the extent to which the parties adhere to the model's recommended language or otherwise adopt additional protections for KEDO.

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## Agency Comments and Our Evaluation

We provided a draft of this report to KEDO and the Department of State for their review and comment. KEDO provided comments on relevant topics in the report but explained that it could not comment fully in the time available. We incorporated KEDO's comments, as appropriate.

The State Department, whose comments are reproduced in appendix VII, disagreed with three aspects of our report. First, State said that we implied that the United States will end up "bankrolling" activities arising from the Agreed Framework in the event of a funding shortfall. Also, State pointed out that it has gone to great lengths to arrange financing from the international community and that a "substantial portion" of the community had joined, or would soon join, in financing activities arising from the Agreed Framework. State indicated that any future funding shortfall will have to be addressed by all interested parties, not by the United States alone.

In our view, we have not implied that the United States will end up bankrolling activities arising from the Agreed Framework. In fact, our report clearly indicates that South Korea and Japan are expected to bear



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the majority of these costs. Moreover, in discussing our draft report, State officials agreed that uncertainties exist about (1) the total cost to implement the Agreed Framework, (2) the amount of future contributions to KEDO, and (3) who will pay for activities resulting from the agreement in the event of a funding shortfall. Furthermore, while we credit State for its efforts to secure international funding for KEDO, significant funding shortfalls exist and are likely to continue, raising serious questions about how KEDO will finance future oil deliveries without the intervention of an interested party. While we focus on the potential cost implications to the U.S. government, absent adequate funding the same points could be made for any of the other nine existing KEDO members. As a result, the possibility remains that, absent adequate funding, the United States—as both a party to the Agreed Framework and a founder of KEDO—could be called upon to finance a significant portion of future oil purchases.

Second, State said that the report implied that U.S. financing of the initial safe storage of North Korea's spent fuel means that the United States will also pay for the eventual removal of the fuel from North Korea. State noted that no decision had been reached about the disposal of the fuel and that there is strong international interest in participating in the eventual removal and disposal of the fuel. Finally, according to State, U.S. financing of the safe storage of North Korea's spent fuel was an initial obligation agreed to by the U.S. government at the time that the Agreed Framework was signed.

We have not implied that U.S. financing of the initial storage of North Korea's spent fuel is in any way associated with the future funding for the removal and disposal of North Korea's spent fuel. Our report clearly acknowledges that no decision has been made in this area and that such a decision is years away. We also are aware that several countries are interested in studying North Korea's spent fuel—a first step in the fuel's eventual removal. Instead, our report notes that no party has committed to pay either the cost of disposal or the cost of dismantling North Korea's existing nuclear facilities, a circumstance that we believe raises questions about the United States' future role in paying for these activities. Furthermore, while the United States apparently agreed to finance the safe storage of North Korea's spent fuel at the time that the Agreed Framework was signed, neither the Agreed Framework nor any other document that we reviewed legally obligates the United States to pay these costs.

Finally, State indicated that we had taken a “fundamentally flawed approach” to the issue of North Korea's responsibility for upgrading its

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power grid—a topic discussed in appendix I of this report. According to State, there are no grounds for speculating that KEDO or its member states will undertake to pay these costs because the supply agreement between KEDO and North Korea and associated documents firmly establish North Korea’s responsibility for the grid’s upgrade. State further commented that North Korea does not owe KEDO a duty to upgrade the grid any more than it owes KEDO a commitment to pave the streets of Pyongyang.

Our report discusses State’s view that North Korea is responsible for upgrading its power grid for use in operating the light-water reactors. Furthermore, we point out that KEDO did not seek North Korea’s legal commitment to upgrade the power grid during negotiations on the supply agreement because, according to State, it would have been illogical for North Korea to owe KEDO a legal duty to upgrade its own electricity power grid. Nevertheless, absent firm assurances that North Korea intends to pay for the upgrade, we continue to believe that there is nothing to preclude North Korea from reasserting a future demand that others pay for the upgrade. We believe that this possibility is even more likely given the need for humanitarian assistance to North Korea and its overall economic situation.

State Department officials also provided comments on the presentation and content of the report, which we included, as appropriate. In addition, we provided applicable sections of this report to the Departments of Commerce, Defense, Energy, and Treasury, and as well as representatives of numerous U.S. and international nuclear industry businesses contacted during our work. We incorporated their comments, as appropriate.

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## Scope and Methodology

To obtain information for this report, we reviewed and analyzed the Agreed Framework and subsequent agreements, applicable U.S. laws and regulations, and documentation related to the implementation of the Agreed Framework. We also interviewed cognizant officials from the Departments of Commerce, Defense, Energy, State, and Treasury and officials from the Central Intelligence Agency, the International Atomic Energy Agency, the Nuclear Regulatory Commission; and domestic and international representatives of the nuclear industry. We attempted to contact the governments of Japan, North Korea, and South Korea through the State Department to obtain their views about the implementation of the Agreed Framework. However, we were unable to do so. We conducted our work from December 1996 through May 1997 in accordance with generally accepted government auditing standards.

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As agreed with your office, we plan no further distribution of this report until 15 days after the date of this report. At that time, we will send copies to the appropriate congressional committees, the Secretary of State, the Executive Director of KEDO, and other interested parties. We will also make copies available to others upon request.

If you have any questions, please call me at (202) 512-3841. Major contributors to this report are listed in appendix VIII.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Victor S. Rezendes". The signature is fluid and cursive, with the first name "Victor" and last name "Rezendes" clearly distinguishable.

Victor S. Rezendes  
Director, Energy, Resources,  
and Science Issues

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**Abbreviations**

BNFL	British Nuclear Fuels, plc.
DOE	Department of Energy
EBWR	Experimental Boiling-Water Reactor
GAO	General Accounting Office
IAEA	International Atomic Energy Agency
KEDO	Korean Peninsula Energy Development Organization
KEPCO	Korea Electric Power Corporation
MW(e)	megawatt electric
NPT	Nuclear Non-Proliferation Treaty
OFAC	Office of Foreign Assets Control
SPRU	Separations Process Research Unit

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# Costs to Implement the Agreed Framework Are Uncertain

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The Agreed Framework outlines numerous actions which, if fully implemented, would result in costs for a wide range of activities over an extended period. Some of these activities are ongoing while others are not expected to begin for many years. The principal ongoing activities—the supply of the reactors and heavy fuel oil—are being carried out by the Korean Peninsula Energy Development Organization (KEDO). The United States and the International Atomic Energy Agency (IAEA) are also performing activities—such as monitoring North Korea’s nuclear facilities and storing its spent nuclear fuel—specified in the Agreed Framework. Shortly after the signing of the Agreed Framework, the U.S. State Department estimated that U.S. contributions to KEDO would likely be between \$20 million and \$30 million annually. As of April 1, 1997, the United States had approved about \$82 million in funding to implement the Agreed Framework, including \$51 million in contributions to KEDO and over \$31 million in other funding. The total amount of future U.S. expenditures is not known, in part, because of uncertainties about the amount that other countries will contribute. Also, reliable estimates of the Agreed Framework’s total cost are still not available.

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## Cost Estimates for KEDO Activities

KEDO is currently incurring costs to implement the Agreed Framework in three areas—the reactor project, the heavy fuel oil purchases, and administrative expenses. KEDO could incur additional costs if its activities expand to other areas in the future.

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## Nuclear Reactor Costs

In December 1994, the Department of State estimated that supplying the two 1,000-MW<sub>(e)</sub> reactors to North Korea would cost about \$4 billion, most of which was expected to be borne by South Korea and Japan. KEDO could not provide an updated estimate of the reactors’ cost because, according to KEDO, the reactors’ cost and schedule are part of ongoing negotiations with the Korea Electric Power Corporation—the prime contractor for the project.<sup>1</sup> South Korea and Japan have informed KEDO that they intend to play “central” and “significant” roles, respectively, in financing the reactors; however, according to KEDO, specific commitments have not yet been received. Through mid-May 1997, South Korea and Japan had contributed \$9 million for site survey and other preconstruction work.

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<sup>1</sup>Appendix III provides additional information about these negotiations.

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## Heavy Fuel Oil Costs

KEDO is also supplying heavy fuel oil to North Korea to offset the energy foregone due to the freeze on its nuclear power program.<sup>2</sup> From January 1995 through mid-May 1997, the United States and, primarily, KEDO purchased and delivered about 735,000 metric tons of heavy fuel oil valued at about \$91.4 million. Assuming 1996 costs—an average of about \$130 per metric ton; including freight, insurance, and interest costs—and completion of the first reactor between 2001 and 2002,<sup>3</sup> the total cost of the heavy fuel oil would range from \$407 million to about \$470 million.<sup>4</sup> While historical costs are known, future costs for the heavy fuel oil purchases cannot be estimated with any degree of confidence because the price for oil commodities on the world market can differ significantly from their historical levels. In addition, the world price of heavy fuel oil is heavily influenced by winter weather conditions in the consuming region—a factor that is difficult, if not impossible, to forecast. Because of this, KEDO noted that it cannot anticipate the total cost of the oil. Furthermore, according to KEDO, agreement has not been reached on a specific schedule for completing the first reactor. As a result, the duration of the oil purchases and deliveries is not yet known.

The Agreed Framework specifies that, the United States—representing an international consortium—will make arrangements to offset the energy foregone due to the freeze on North Korea's nuclear program, pending completion of the first reactor. Through mid-May 1997, KEDO had received a total of about \$68.2 million for possible use in paying for the fuel oil.<sup>5</sup> These contributions were from the European Union and 17 countries, including \$43 million from the United States. KEDO also received three

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<sup>2</sup>The United States and North Korea agreed that 150,000 metric tons of oil would be provided in the year ending October 20, 1995 (1 year after the signing of the Agreed Framework) and that deliveries totaling 500,000 metric tons would be made for each 12-month period thereafter until the first reactor is delivered.

<sup>3</sup>The supply agreement between KEDO and North Korea obligates KEDO to develop a delivery schedule aimed at achieving the reactors' completion by 2003. According to State Department officials, the first reactor is expected to be completed 1 to 2 years before the second reactor.

<sup>4</sup>Actual costs for fuel oil in 1995 were \$15.8 million (for 150,000 metric tons). Actual costs for fuel oil in 1996 were \$65.2 million (for 500,000 metric tons).

<sup>5</sup>The contributions were made to KEDO's heavy fuel account or its account for unrestricted or other purposes. In 1996, KEDO also received \$19 million from Japan as collateral for the oil purchases. Because these funds are collateral, we have not included them in the total amount available for funding the oil purchases.

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**Appendix I**  
**Costs to Implement the Agreed Framework**  
**Are Uncertain**

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contributions of oil valued at about \$6.1 million, including a \$5.5 million contribution from the United States.<sup>6</sup>

Through mid-May 1997, KEDO had supplied about 85,000 metric tons of the 500,000 metric tons due before October 20, 1997. While KEDO could provide a broad base of financial support for implementing aspects of the Agreed Framework, according to KEDO, as of May 1, 1997, it owed about \$46 million and, consequently, had insufficient funds available to meet future oil commitments.<sup>7</sup> KEDO's oil funding shortfall decreased to about \$25 million in mid-May when KEDO received the U.S. contribution for fiscal year 1997.<sup>8</sup> According to KEDO, it expects to receive about \$28.5 million from the European Union later this year following formal approval of an agreement on the European Atomic Energy Community's membership in KEDO and the Community's representation on KEDO's Executive Board. Absent other contributions, the \$28.5 million contribution would result in an estimated \$3.5 million funding surplus. However, this surplus is likely to be short-lived because, at the conclusion of our review, KEDO had purchased less than 20 percent of the oil required to be delivered to North Korea by October 20, 1997.

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**Costs for Fuel Meters and Recorders**

To help ensure that North Korea uses the heavy fuel oil for intended purposes,<sup>9</sup> KEDO has installed meters and sealed recorders to measure and record the flow of oil at six facilities where the fuel is used.<sup>10</sup> Costs to install and maintain the equipment as of April 1, 1997, were about \$875,000 and were paid with funds available for KEDO's fuel oil purchases. According

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<sup>6</sup>Contributions from 17 countries were used to purchase the oil. The contributions were from Argentina, Australia, Brunei, Canada, Finland, Germany, Greece, Malaysia, Netherlands, New Zealand, Norway, Oman, Philippines, Singapore, Switzerland, Thailand, and the United States. Also, Indonesia contributed oil on two occasions.

<sup>7</sup>As of May 1, 1997, KEDO owed about \$27 million to oil suppliers. The remaining \$19 million represents the collateral supplied to KEDO by Japan and used for earlier oil purchases.

<sup>8</sup>The United States contributed \$25 million for fiscal year 1997. According to KEDO, \$21 million of the total amount is available for heavy fuel oil purchases, the remaining amount will be used for KEDO's administrative expenses.

<sup>9</sup>The Agreed Framework specifies that the fuel is for heating and electricity production. In 1995, the State Department disclosed that North Korea may have "diverted" a "small portion" of the first oil delivery for other uses.

<sup>10</sup>The six facilities are Chongjin, East Pyongyang, Pukchang, Pyongyang, Sonbong, and Suncheon. According to KEDO, the facilities are thermal power plants with no purpose other than the production of electricity and heating. North Korea provides KEDO with daily flow (consumption) meter readings from the plants. Specifically, according to KEDO, North Korean personnel retrieve the electronically stored measurements from sealed recorders and fax the readings to KEDO. The readings are received on a bi-weekly basis and monitored by KEDO staff. According to KEDO, North Korea cooperates fully in the fuel monitoring effort.



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to KEDO, KEDO has no plans to install equipment at other North Korean facilities; however, it may upgrade existing equipment at four of the six facilities that have not yet received the latest equipment. KEDO estimated that each of the upgrades would cost about \$5,000 or, about \$25,000 in total, including about \$5,000 in travel-related expenses to install the equipment. According to KEDO, future costs for monitoring North Korea's use of the heavy fuel oil are expected to be small compared with the overall cost of the heavy fuel oil purchases.

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## Administrative Costs

In 1996—the first full year of its operation—KEDO's administrative costs were about \$9.9 million. As the reactor project progresses, KEDO expects its administration costs will increase given the need for additional staff to support the project. However, according to KEDO, it “cannot anticipate the size or speed” of the increase. According to KEDO, the three founding members—Japan, South Korea, and the United States—have agreed to share equally in KEDO's administrative costs.

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## Future Costs

While KEDO's current costs are confined to three areas—the reactor project, the heavy fuel oil purchases, and its administrative expenses—its activities could expand in the future. Specifically, the agreement creating KEDO allows it to implement “other measures” deemed necessary to accomplish the objectives of the Agreed Framework. KEDO told us that any such measures would be at the instruction of KEDO's Executive Board.<sup>11</sup> According to KEDO, it has not speculated on what additional costs it might eventually incur in fulfilling its purposes. While there are no current plans to expand KEDO's activities, according to the State Department, there have been discussions about KEDO becoming involved in studies on the disposition of spent nuclear fuel from North Korea's 5-MW(e) reactor using contributions received for that purpose.

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## Cost Estimates for IAEA Activities

As provided in the Agreed Framework, IAEA is monitoring activities at five North Korean facilities, including the 5-MW(e) reactor, the reprocessing plant, and the fuel fabrication facility to ensure that the facilities do not

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<sup>11</sup>At the conclusion of our review, the Executive Board was composed of representatives from each of the three founding members. However, KEDO plans to include the European Atomic Energy Community on its Executive Board.

operate (i.e., that the nuclear freeze remains in place).<sup>12</sup> If the Agreed Framework is fully implemented, IAEA would also have a significant future role in carrying out the agreement. For example, North Korea must resolve IAEA's questions about North Korea's past production and separation of plutonium before it can receive key nuclear components for the light-water reactors.

According to an IAEA official, IAEA's activities in North Korea cost about \$5 million in 1995. In 1996, costs increased to about \$6.7 million because of a greater inspection presence during the storage of North Korea's spent fuel. The official estimated that costs for 1997 would be similar to the 1996 costs. Future costs are likely to decline because IAEA expects to reduce its inspection presence in North Korea from four to two inspectors when the Department of Energy (DOE) completes storing North Korea's existing spent fuel later this year.<sup>13</sup> According to the IAEA official, IAEA has not previously carried out a continuous monitoring effort and, therefore, it has no comparable information on which to base future estimates.

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## **U.S. Costs to Implement the Agreed Framework as of April 1, 1997**

In January 1995, the Secretary of State estimated that the U.S. contribution to KEDO would likely be between \$20 million and \$30 million annually and called it a "modest contribution" compared with the "billions of dollars" that the United States expects South Korea and Japan will eventually contribute. According to State, total U.S. costs to implement the Agreed Framework would be tens of millions of dollars. As of April 1, 1997, the United States had approved about \$82 million to implement the Agreed Framework.<sup>14</sup> More than half of this amount—\$51 million—was in the form of direct funding to KEDO. Specifically, the United States contributed \$4 million to KEDO in fiscal year 1995, \$22 million in fiscal year 1996, and \$25 million in fiscal year 1997.<sup>15</sup> The \$4 million initial contribution was used to help establish KEDO and the remaining funds were for KEDO's administrative expenses and, primarily, its heavy fuel oil purchases. Furthermore, to meet the 90-day deadline set by the Agreed Framework

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<sup>12</sup>IAEA is an autonomous intergovernmental organization within the United Nations. IAEA's objectives are to promote the peaceful use of nuclear energy and to verify that nuclear material under its supervision or control is not used to further any military purpose. The United States contributes about 25 percent of IAEA's regular budget funding.

<sup>13</sup>According to IAEA, for credibility purposes, it must maintain at least two inspectors in North Korea at all times.

<sup>14</sup>During the same period, South Korea contributed \$10.5 million and Japan contributed \$27.9 million. As discussed earlier, the Japanese contribution includes \$19 million for use as collateral in securing loans for the heavy fuel oil purchases.

<sup>15</sup>The State Department is requesting \$30 million for KEDO in fiscal year 1998.

for the delivery of the first heavy fuel oil shipment, the Department of Defense purchased and delivered about 50,000 metric tons of heavy fuel oil at a cost of \$5.5 million in January 1995. The delivery occurred about 2 months before KEDO was established and was paid for with appropriated Defense Department funds designated for emergency and extraordinary expenses.

As discussed earlier, as of May 1, 1997, KEDO owed about \$46 million and, consequently, had insufficient funds to pay for future heavy fuel oil purchases. While KEDO's funding situation has since improved, according to a letter from State's Acting Assistant Secretary for East Asian and Pacific Affairs, KEDO will continue to face financial difficulties and will be forced, as in the past, to incur debt to finance some of its activities if it does not receive sufficient contributions. However, the official noted that the United States, South Korea, and Japan will continue to urge members of the international community to support the organization financially. According to the official, KEDO's funding prospects for 1997 and beyond are expected to improve. Specifically, KEDO is expected to pay off its existing debt with funds received from the United States, the European Union, and other members in 1997.<sup>16</sup> Finally, another State Department official said that no decision has been made to obtain additional fiscal year 1997 funds for KEDO beyond the \$25 million already appropriated by the Congress.

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## **U.S. Costs for Storing North Korea's Spent Fuel**

The Agreed Framework specifies that the United States and North Korea will cooperate in finding a method to store safely the spent fuel from the 5-MW(e) experimental reactor during the construction of the light-water reactors. As of April 1, 1997, DOE had received about \$25.8 million to cooperate with North Korea in this area.<sup>17</sup> Specifically, DOE (1) has treated and stabilized the water in the basin containing the spent fuel discharged from North Korea's 5-MW(e) reactor; (2) has vacuumed corroded fuel "sludge" and other debris from about one-half of the basin's bottom; (3) has installed new fuel storage racks and repackaging equipment and, in April 1996; (4) began repackaging the spent fuel.<sup>18</sup>

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<sup>16</sup>The European Union is expected to contribute \$18.5 million annually for 5 years based on current exchange rates.

<sup>17</sup>This includes \$11.5 million in appropriated funds, \$14.1 million in reprogrammed funds, and an initial outlay of \$200,000 from funds originally appropriated for regional arms control and nonproliferation activities. According to DOE, the initial \$200,000 was used to (1) purchase equipment to measure water properties and to provide underwater viewing and (2) design the water treatment system.

<sup>18</sup>DOE refers to its repackaging activities as "canning."

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North Korea's spent fuel—called “magnox”—is clad with a magnesium-zirconium alloy. Unlike spent fuel from light-water reactors, the magnox cladding corrodes rapidly and, as a result, is not suitable for long-term storage in water.<sup>19</sup> Repackaging the fuel provides a number of benefits. For example, by isolating the fuel from the water, repackaging minimizes the risk of radiological hazards and helps minimize corrosion.<sup>20</sup> Repackaging also facilitates efforts to safeguard the fuel. Finally, repackaging is a necessary first step in the fuel's subsequent removal from North Korea.

DOE originally estimated that it could (1) treat and stabilize the water basin and (2) repack the fuel for \$10.2 million using contracts funded in fiscal year 1995. Thereafter, DOE estimated that it would need about \$1 million annually for 4 to 7 years to conduct maintenance and monitoring activities.<sup>21</sup> DOE indicated that these estimates were the best available at that time. However, DOE identified numerous uncertainties that could impact the reliability of the estimates, such as the condition of North Korea's water basin and spent fuel and North Korea's working conditions in general.

According to DOE officials, actual funding has exceeded DOE's original estimates because of numerous technical, logistical, and political difficulties experienced in implementing the project. For example, according to DOE, the water treatment and sludge vacuuming operations were more difficult than expected. During preliminary meetings in 1994 and early 1995, DOE learned that North Korea's water treatment system had failed on its first day of operation and that the fuel had been sitting in the untreated water for more than 6 months. As a result, the water was murky and, according to DOE, covered with a considerable amount of suspended material such as algae. The North Koreans requested DOE to upgrade their water treatment system, but DOE decided that constructing a new system

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<sup>19</sup>Reactor operators store spent fuel in a basin of water to cool the fuel and reduce radiation levels. The water in the basin must be chemically controlled to stabilize the fuel during storage. The duration of time in the basin depends on a number of factors, including the fuel's characteristics and the use for which the fuel is intended. Due to water's corrosive effect on the cladding of magnox fuel, the fuel is generally stored in water for relatively short periods before it is reprocessed. The Agreed Framework, however, prohibits reprocessing of the fuel in North Korea.

<sup>20</sup>The repackaged fuel is returned to the water basin for storage. However, the container is filled with a gas mixture, and the fuel is isolated from the water, thereby diminishing the risk of radiation exposure and corrosion.

<sup>21</sup>According to the supply agreement, the “transfer” will (1) begin simultaneous with the delivery of key nuclear components for the first light-water reactor and (2) conclude when the first light-water reactor is completed. DOE expects that the fuel will remain in North Korea for 4 to 7 years, depending on the project's progress.

would be more efficient. Limited sampling revealed the presence of about one-inch of sludge (corrosive product) on the bottom of the spent fuel basin. DOE estimated that clarifying North Korea's water basin would take 3 weeks and cost about \$1.4 million. Thereafter, DOE determined that it would need to vacuum sludge from the bottom of the basin to allow the new storage racks and repackaging equipment to be safely placed in the basin. DOE anticipated that the additional sludge vacuuming would cost another \$700,000 and take a little over 1 week to complete. According to DOE, however, delays in obtaining funding approvals and in gaining permission to enter North Korea resulted in additional corrosion, so that by the time the DOE team arrived in September 1995—8 months later—the sludge depth had increased to as much as 6 inches. As a result of these and other problems, water clarification and sludge vacuuming took about 5 months and \$2.44 million to complete.

Difficulties associated with establishing and supporting a nearly constant and protracted U.S. presence at the site also caused cost increases. According to DOE officials, the current level of North Korean technology is such that essentially no materials required for the project are available locally. As a result, through April 16, 1997, DOE had procured and delivered over 200 tons of equipment, spare parts, and other supplies to support the spent fuel project at a cost of \$6.78 million. According to DOE, each delivery took between 2 to 3 weeks because of the necessity of using Beijing, China, as the transshipment point and because of inadequate equipment and infrastructures for handling and transporting the materials once the materials arrived in Pyongyang, North Korea. Finally, the project experienced cost increases arising from a myriad of political difficulties, including difficulties in obtaining visas for U.S. personnel and a 2-month work stoppage indirectly related to North Korea's submarine incursion into South Korean water last fall.

As of April 16, 1997, DOE had repackaged 75 percent of North Korea's estimated 8,000 fuel rods. Barring unforeseen difficulties, DOE hopes to complete repackaging in August 1997. However, according to DOE, numerous uncertainties remain, including the possibility of major damage to equipment and further diplomatic problems, that could affect the project's cost and schedule. Once repackaging is complete, DOE estimates that it will need about \$5 million annually during the estimated 4 to 7 year period before the fuel can be removed from North Korea. The increase over the original \$1 million estimate is based on DOE's experience working in North Korea, including the occurrence of frequent power outages, logistic and transportation complications, regular equipment failures, and

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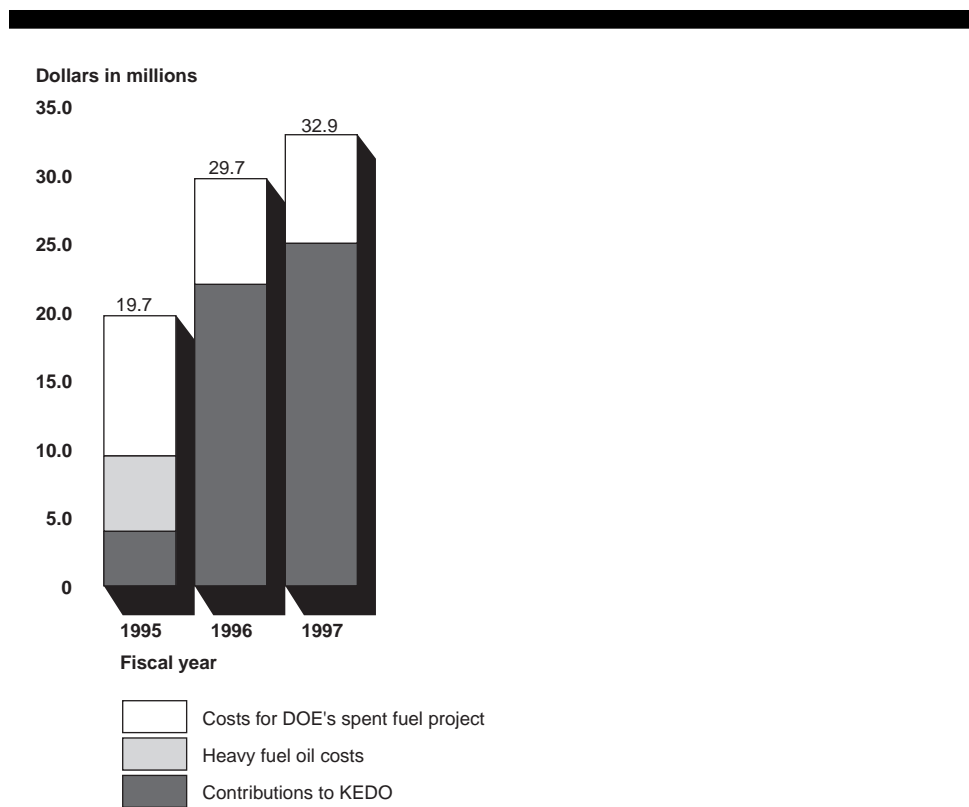
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high maintenance costs. According to DOE, the estimate also includes costs for equipment maintenance, spent fuel/canister maintenance, and personnel costs, as well as costs to resolve unusual problems involving the physical integrity of the spent fuel, and on-site technical support for IAEA's safeguard activities. Figure I.1 illustrates total U.S. funding in support of the Agreed Framework as of April 1, 1997.

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**Figure I.1: Total U.S. Funding of \$82.3 Million in Support of the Agreed Framework as of April 1, 1997**



Notes: 1. Funding for fiscal year 1995 includes \$4 million in start-up costs for KEDO, \$5.5 million for the first heavy fuel oil shipment, and \$10.2 million for DOE's treatment and storage of North Korea's nuclear power reactor spent fuel project.

2. Funding for fiscal year 1996 includes a \$22 million contribution to KEDO and \$7.7 million for DOE's spent fuel project.

3. Funding for fiscal year 1997 includes a \$25 million contribution to KEDO and \$7.9 million for DOE's spent fuel project.

4. The United States incurs salary, travel, and other costs associated with carrying out the Agreed Framework, including the cost of resolving bilateral issues of concern, such as the identification and return of U.S. soldiers missing in action from the Korean War. We did not quantify these costs.

5. As of April 1, 1997, the United States had provided \$33.4 million in emergency assistance for North Korea. These costs are not included because, according to State, the assistance was provided solely for humanitarian reasons and has no bearing on the Agreed Framework's costs.

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## **Future U.S. Costs to Implement the Agreed Framework Are Not Known**

For fiscal year 1998, the State Department is requesting \$30 million for KEDO, and DOE is requesting \$5 million to, among other things, monitor North Korea's spent fuel. State did not estimate the amount of future funding that it expects to request for KEDO. Instead, in a written response to our inquiries, the Acting Assistant Secretary for East Asian and Pacific Affairs, referenced State's earlier estimate of between \$20 million to \$30 million annually and said that the amount may vary throughout the life of the Agreed Framework. Furthermore, according to this official, future expenditures will be carried out in accordance with appropriate congressional committees and with their approval. Regarding the duration of U.S. contributions to KEDO, the official said that State will continue to seek funding for KEDO as long as KEDO continues to carry out activities related to the implementation of the Agreed Framework.

The Acting Assistant Secretary for East Asian and Pacific Affairs did not respond to our inquiry about the amount of other future funding that may be needed to implement the Agreed Framework. However, according to other State officials, the Department will need about \$1.5 million annually to operate a liaison office in North Korea once the parties agree to open the offices.<sup>22</sup>

Assuming full implementation of the Agreed Framework, as time progresses, costs will also be incurred for a wide range of other activities, including the disposal of North Korea's spent fuel and the dismantlement of North Korea's existing nuclear facilities. However, little is known about the cost of these activities, and the estimates that do exist are highly speculative. None of the agreements concluded to date obligate the United States, KEDO, or North Korea to pay these costs. While KEDO's role could expand to include these areas, neither KEDO nor any other party has agreed to pay for these activities.

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## **Estimate of Spent Fuel Disposal Costs**

Department of State and DOE officials could not provide us with an estimate for the costs of disposing of North Korea's spent fuel. According to these officials, it is premature to estimate the costs because a decision about what to do with the spent fuel, including its final destination, will not be made for several years. One possible disposal option is to reprocess the fuel and store it until an underground repository is available. According to representatives of British Nuclear Fuels, plc. (BNFL)—a company that provides commercial reprocessing services—it would cost

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<sup>22</sup>The Agreed Framework specifies that the United States and North Korea will exchange liaison offices as a step toward normalizing their political relations.



between \$50 million to \$100 million to transport, reprocess, treat the waste, and, assuming that other arrangements are not made, store the resulting products of North Korea's spent fuel for up to 5 years. In addition to the cost of reprocessing, costs would also be incurred to permanently dispose of the plutonium and the one canister of radioactive waste in an underground repository. We could not determine the costs of disposing of these materials because, among other factors, the disposal location and the cost of preparing the materials for disposal are not known. It is also too early to determine the cost to permanently dispose of North Korea's unprocessed spent fuel in an underground repository, because the development of underground repositories is in the early stages. In the United States, however, the projected cost to dispose of 50,000 kilograms of spent fuel—the quantity in North Korea's possession—would be about \$15.8 million. (App. II provides additional information on fuel disposal options and their associated costs.)

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### **Estimate of Costs to Dismantle North Korea's Nuclear Facilities**

The Agreed Framework provides that North Korea will stop operating its 5-MW(e) reactor and related nuclear facilities and stop construction on two larger reactors, and that it will eventually dismantle the facilities. According to the supply agreement between KEDO and North Korea, dismantlement will begin when the first reactor is finished and will be completed when the second reactor is finished.

Three of North Korea's facilities—the 5-MW(e) reactor, the plutonium reprocessing plant, and the fuel fabrication facility—have been in operation and, therefore, would be costly to dismantle due to radioactive contamination. State Department and DOE officials could not estimate the cost of dismantling these facilities and, according to State, it will be years before a decision is reached about who will bear these costs. However, in April 1995, State reported that the two partially constructed reactors—the 50-MW(e) and the 200-MW(e)—could be dismantled using conventional methods. State noted that dismantling the 5-MW(e) reactor would be more expensive because of radiological contamination and the need to use specialized tools and processes.

The Congressional Research Service has reported that dismantling the two partially constructed reactors could cost about \$500 million and that dismantling the radioactive facilities could cost much more.<sup>23</sup> We could not verify the reliability of the \$500 million estimate because, according to the report's author, the estimate is based on South Korean press accounts.

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<sup>23</sup>North Korea's Nuclear Weapons Program (Feb. 24, 1997).

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However, we contacted TLG Services, Inc.—a U.S. company offering decommissioning cost studies and other decommissioning services—to obtain information about these costs.<sup>24</sup>

According to TLG Services, Inc., it is not possible to estimate the cost of dismantling the two partially constructed reactors, using conventional methods, without knowing what needs to be demolished and the technical problems surrounding the job. According to the company, recent costs for decommissioning two small U.S. reactors were about \$19.6 million and \$13.8 million.<sup>25</sup> Furthermore, DOE has estimated that decontaminating and decommissioning the Separations Process Research Unit (SPRU) reprocessing facility at the Knolls Atomic Power Laboratory in Schenectady, New York, would cost about \$144.8 million.

While the two U.S. reactors and the SPRU reprocessing facility appear comparable in size to North Korea's nuclear facilities,<sup>26</sup> the cost to decommission these facilities may not be useful in estimating the cost to dismantle North Korea's 5-MW(e) reactor for a number of reasons. In the United States, decommissioning includes the removal and disposal of all radioactive components and materials and the clean-up of any radioactivity that may remain so that the facility can be used for unrestricted purposes. Neither the Agreed Framework nor the supply agreement specifies that the facilities will be restored to their nonradioactive states. Instead, according to documentation obtained from the State Department, dismantlement—as used in the Agreed Framework—is limited to the disassembly and destruction of the facilities' components and equipment to the point that they are no longer useful. In addition, we could not determine the costs of North Korean labor, transportation, and storage of the low-level waste—key components in developing a reliable estimate.

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**Cost Estimates for**  
**Upgrading North Korea's**  
**Power Grid**

Other costs are indirectly related to the Agreed Framework and subsequent agreements. For example, North Korea's existing electricity transmission and distribution system is inadequate to handle the electricity that would be generated by two new 1,000 MW(e) light-water

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<sup>24</sup>According to the company, it has provided decommissioning cost studies for 85 percent of the commercial nuclear power units in the United States.

<sup>25</sup>The two recently decommissioned reactors were the Experimental Boiling-Water Reactor (EBWR) at the Argonne National Laboratory and the Pathfinder reactor in South Dakota. The reactors are comparable in size to North Korea's 5-MW(e) reactor.

<sup>26</sup>We could not identify a comparable sized fuel fabrication facility for comparison purposes.

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reactors. As a result, much of North Korea's existing equipment will need to be replaced or modernized before the reactors can be used. According to the State Department, the upgrade could include the replacement or modernization of substations and transformers, transmission towers, and high-voltage cables. In April 1995, the State Department estimated that the cost to modernize 740 kilometers of existing transmission lines, including installation costs, could reach \$750 million.<sup>27</sup> The United States and KEDO maintain that North Korea is responsible for paying for the upgrades; however, North Korea has not yet obligated itself to pay.<sup>28</sup>

In a letter dated April 25, 1997, the State Department's Acting Assistant Secretary for East Asian and Pacific Affairs informed us that the \$750 million estimate was developed by DOE personnel. According to the letter, the estimate is not a precise estimate derived from a thorough study of North Korea's existing power grid. Instead, DOE used a 1987 study by the National Regulatory Research Institute to determine the average cost per mile/kilometer for installing new transmission lines in the United States.<sup>29</sup> The resulting estimate was in 1994 dollars and was adjusted to arrive at a rough estimate—about \$430 million—of what the project would cost if undertaken in South Korea. DOE increased the initial estimate to reflect a variety of unknowns in North Korea—the terrain, the quality and cost of North Korean labor, and the availability and quality of equipment and materials needed for the installation—and market variables such as the price of copper. According to the Acting Assistant Secretary for East Asian and Pacific Affairs, the estimate is very conservative, and actual costs are unlikely to exceed the estimate.

We consulted Stone and Webster—a major U.S. architect and engineering company—for an independent estimate of these costs. According to a company official familiar with the terrain on the Korean Peninsula, each of the two transmission lines would cost roughly \$500,000 per mile. The estimate assumes 500,000 volt transmission lines and includes material and labor. The actual cost would depend, among other factors, on the (1) distance between the reactors and the location where the power will

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<sup>27</sup>While there is no commitment in the Agreed Framework to finance the modernization of North Korea's electricity power grid, during deliberations on the supply agreement for the reactors, North Korea demanded that KEDO pay for the modernization. KEDO rejected North Korea's demand. However, North Korea could reassert this demand in the future. For further discussion of this issue see Nuclear Nonproliferation: Implications of the U.S./North Korean Agreement on Nuclear Issues (GAO/RCED/NSIAD-97-8, Oct. 1, 1996).

<sup>28</sup>According to State, KEDO did not formally seek North Korea's legal commitment to upgrade the power grid because it would have been illogical for North Korea to owe KEDO a legal duty to upgrade its own electricity power grid.

<sup>29</sup>The 1987 study is entitled "Some Economic Principles for Pricing Wheeled Power."

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be used and (2) terrain between the locations. We do not know where North Korea will choose to use power generated from the 1,000 MW<sup>(e)</sup> reactors or, consequently, the distance or terrain between these points. However, the majority of North Korea, including Pyongyang—North Korea's capital—appears to be within 150 miles of the reactors' proposed site. Thus, doubling the distance to 300 miles to factor in the likelihood of rolling terrain would result in costs of about \$300 million for the two transmission lines. According to the Stone and Webster official, engineering services would cost another \$15 million—about 5 percent of the overall cost—or, a total of about \$315 million. Furthermore, any costs for permits, if applicable in North Korea, would need to be added to the estimate. Finally, additional costs would be incurred for upgrading the local distribution centers, including the cost of constructing substations.

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# Options for Disposing of North Korea's Existing Spent Nuclear Reactor Fuel

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North Korea has about 50,000 kilograms of spent fuel from its 5-megawatt electric (MW<sub>(e)</sub>) reactor that had been operating before the freeze on North Korea's nuclear program.<sup>1</sup> The spent fuel from the reactor contains, among other materials, about 25 kilograms of plutonium that the United States feared would be used to produce nuclear bombs. To address this threat, the Agreed Framework specifies that the United States and North Korea will cooperate in finding a method to dispose of the fuel in a safe manner that does not involve reprocessing of the fuel in North Korea. According to annex 3 of the supply agreement that implements portions of the Agreed Framework, removal of the fuel will begin when key nuclear components for the first light-water reactor are delivered and conclude when the first light-water reactor is completed.<sup>2</sup> Thus far, no decisions have been made about what to do with the spent fuel or who will be responsible for disposing of the fuel once it is removed from North Korea. These and other decisions are not expected to be made for several years since construction has not yet begun on the first reactor.

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## Spent Nuclear Fuel Disposal Options

There are two options for dealing with North Korea's spent fuel. One option is to reprocess the fuel in a country other than North Korea and to store the resulting high-level waste until it can be disposed of properly. The other option is to package and store the fuel for an interim period before its final disposal. Governments around the world support the use of deep underground repositories as the best method for the final disposal of highly radioactive waste, but no country has yet built such a facility.

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## Reprocessing and Subsequent Disposal

Reprocessing is the chemical separation of the spent fuel into its three parts—plutonium, uranium, and highly radioactive reactor waste. Several countries have the capability to reprocess North Korea's spent fuel, but only two—the United Kingdom and France—have companies that offer commercial reprocessing services.<sup>3</sup> These companies also have direct experience in reprocessing magnox fuel—the type of fuel used in North Korea's 5-MW<sub>(e)</sub> reactor.<sup>4</sup>

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<sup>1</sup>The 50,000 kilograms of spent fuel are contained in about 8,000 fuel rods.

<sup>2</sup>As discussed earlier, the spent fuel will not begin to be removed from North Korea for 4 to 7 years, depending on the project's progress.

<sup>3</sup>The other countries with reprocessing capabilities include China, India, Russia, Japan, and the United States.

<sup>4</sup>The fuel rods used in North Korea's 5-MW<sub>(e)</sub> reactor have an outer coating, called cladding, that is made of an alloy of magnesium and zirconium. Fuel with this type of cladding is called magnox.

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**Appendix II**  
**Options for Disposing of North Korea's**  
**Existing Spent Nuclear Reactor Fuel**

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Two companies provide commercial reprocessing services—British Nuclear Fuels plc. (BNFL) of the United Kingdom and Cogema of France—and both have expressed interest in reprocessing North Korea's spent fuel.<sup>5</sup> If either of these companies is selected to do the reprocessing, under normal circumstances, the repackaged spent fuel would be picked up, transported to the company's reprocessing facility, and placed in interim storage until it is reprocessed. Neither company would normally take title to the spent fuel or the products of reprocessing so, unless other arrangements are made, the separated materials would be stored for up to 5 years and, eventually, returned to the country of origin. The specific terms of the commercial arrangement would be defined in a contract between the parties. According to BNFL, other matters—such as ownership and liability for the fuel after its removal—would be defined in letters between the governments.

According to BNFL, reprocessing North Korea's spent fuel would result in approximately 25 kilograms of plutonium, 50,000 kilograms of uranium, and 160 liters (one canister) of high-level waste. If the spent fuel is reprocessed, the separated plutonium and uranium would be purified and converted into stable compounds that can be safely stored until final disposal.<sup>6</sup> The separated uranium and plutonium could be used as fuel for a nuclear power reactor. If not used as fuel, the plutonium would be disposed of in an underground radioactive waste repository, and the uranium would be stored for its economic value and potential use. The radioactive waste would be mixed with melted glass and poured into a steel canister to harden—a process called vitrification—and eventually disposed of in an underground repository.<sup>7</sup>

BNFL representatives estimated that it would cost between \$50 million to \$100 million to transport and reprocess North Korea's spent fuel, treat the

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<sup>5</sup>France is expected to close its magnox reprocessing facilities later this year but, according to a Cogema official, France has other facilities that could reprocess North Korea's magnox fuel. The magnox reprocessing facilities in the United Kingdom are expected to operate until at least 2006.

<sup>6</sup>According to DOE, the plutonium from the high-level waste need not be separated during reprocessing. However, leaving the plutonium with the high-level waste might require modification of the reprocessing facility to avoid a nuclear reaction.

<sup>7</sup>According to BNFL, the United Kingdom expects to store its vitrified waste for a minimum of 50 years before final disposal in an underground repository.

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waste, and store the resulting products for up to 5 years.<sup>8</sup> In addition to the cost of reprocessing, costs would also be incurred for the final disposal of the plutonium and the one canister of radioactive waste in an underground repository. We could not determine the costs of disposing of these materials because, among other factors, the disposal location and the cost of preparing the materials for disposal are not known.<sup>9</sup>

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## Underground Disposal

Permanent disposal of long-lived and highly radioactive nuclear waste, such as spent fuel and its byproducts, presents an extremely difficult challenge. Governments around the world support the use of deep underground repositories as the best method for safely disposing of highly radioactive waste, but no country has yet built such a facility. Many countries studying underground repositories, including the United States, have encountered difficulties and most do not plan to have a repository available until 2020 or later. The United States expects its repository will begin accepting waste after 2010.

The nuclear material that will be disposed of in an underground repository could be in several forms—spent reactor fuel, highly radioactive waste that has been stabilized by vitrification or a similar process, or materials like plutonium that will be radioactive for an extremely long time. Whatever the form, the waste must be packaged to prevent the radioactive material from leaking out. In the United States, the package design must be reviewed and approved by the Nuclear Regulatory Commission. Other countries have similar requirements, but none have approved a package design for underground disposal.

Underground disposal of North Korea's spent fuel—without reprocessing—is also an option, although it may not be acceptable to national licensing authorities. According to experts in the United Kingdom, magnox corrodes easily and rapidly and is difficult to package safely for long-term disposal. According to these experts, in 1986, the United Kingdom's House of Commons Environment Committee on Radioactive

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<sup>8</sup>According to BNFL representatives, BNFL could provide the necessary export facilities in North Korea and convert all the products to a stable form for storage. However, the estimate does not include the costs of returning the residual waste material resulting from reprocessing. The representatives noted that the actual costs will be affected, to some extent, by the condition of the spent fuel at the end of the storage period in North Korea. BNFL's estimate assumes that a "safety case can be made for the transport of the fuel and that this does not significantly affect the transport conditions." Furthermore, BNFL assumes that the fuel's condition will be compatible with safe handling requirements and processing conditions. The estimate, which is in 1997 dollars, also includes the cost of safeguarding the separated materials.

<sup>9</sup>Based on DOE's projected cost of developing the U.S. underground repository, the cost to dispose of a canister of high-level waste will be about \$357,000. The actual cost in the United States or elsewhere is not available because a repository has not been completely studied, developed, or put into service.

Waste concluded that direct disposal was not an acceptable option for magnox fuel because of its high intrinsic chemical reactivity. Demonstrating to regulatory authorities that North Korea's spent fuel can be safely disposed of may be even more difficult because the fuel has deteriorated badly—the magnox is completely or partially gone from many of the fuel rods and cracked on others.

It is too early to determine the cost to dispose of North Korea's spent fuel since countries are still in the early stages of developing their underground repositories. In the United States, for example, DOE's projected cost to package and dispose of commercial spent fuel in the Yucca Mountain repository is about \$317 per kilogram. On the basis of DOE's projected cost, we estimated that the cost to dispose of 50,000 kilograms of North Korea's spent fuel would be about \$15.8 million. According to a DOE representative, additional costs might also be incurred to pretreat North Korea's spent fuel before final packaging.

The United States has about 2.1 million kilograms of spent fuel from its weapons plutonium production reactors that it has decided to store for up to 40 years before disposal. The United States considered both reprocessing and underground disposal. The current plan for the spent fuel is to store the fuel in canisters until a decision is made about what to do with it. Although the U.S. spent fuel is not magnox fuel, both the U.S. and North Korean spent fuel have many similar characteristics. For example, some of both are badly deteriorated and would require a multiple barrier package before disposal in an underground repository. Because the disposal problems are similar, from a technical standpoint, the 50,000 kilograms of North Korean spent fuel could be disposed of by the United States along with its spent fuel. State Department officials stressed that the U.S. government has never considered disposing of North Korea's spent fuel in this manner.

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## **Decisions About North Korea's Spent Fuel Are Not Expected for Several Years**

According to the State Department, decisions have not been made about (1) who will be responsible for North Korea's spent fuel once it is removed from the country, (2) the method of disposal, (3) the party responsible for implementing the disposal method, or (4) the fuel's final destination. According to State, it will be several years before these decisions are made since construction has not yet begun on the first reactor.<sup>10</sup>

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<sup>10</sup>As discussed earlier, transfer of the fuel will begin when key nuclear components for the first light-water reactor are delivered and conclude when the first light-water reactor is completed.



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**Appendix II**  
**Options for Disposing of North Korea's**  
**Existing Spent Nuclear Reactor Fuel**

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While the United States generally discourages reprocessing and the subsequent use of plutonium in civil power reactors, according to the State Department, the United States has not excluded reprocessing from consideration. Specifically, State said that all factors and methods that are safe and in accordance with international procedures will be considered as long as the disposal option is implemented outside of North Korea. However, according to State, if reprocessed, the United States would not agree to allow the separated plutonium to return to North Korea for any purpose, including for use as fuel in the light-water nuclear power reactors.<sup>11</sup>

According to State, numerous parties will be involved in the disposal decision, including the relevant U.S. agencies. Also, State said that it would consult closely with South Korea and Japan—as well as the International Atomic Energy Agency and KEDO, if appropriate. Furthermore, as provided in the Agreed Framework, the final decision will be made in cooperation with North Korea.

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<sup>11</sup>State did not address the possible use of North Korean plutonium in reactor fuel for another country.

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# Contracting Arrangements and Actions Arising From the Agreed Framework

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The Agreed Framework between the United States and North Korea specifies that the United States will organize under its leadership an international consortium to finance and supply the nuclear power reactor project. By agreement dated March 9, 1995, the United States, Japan, and the Republic of Korea (South Korea) created KEDO to implement portions of the Agreed Framework.<sup>1</sup> The agreement authorizes KEDO to enter into agreements, contracts, or other arrangements, including loan arrangements,<sup>2</sup> with states, international organizations, or other appropriate entities to finance and supply North Korea with two light-water nuclear power reactors and heavy fuel oil until the first reactor is completed. The agreement also allows KEDO to implement “other measures” deemed necessary to supply the reactors and heavy fuel oil or to otherwise implement the Agreed Framework.

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## KEDO Has Contracted for a Wide Variety of Services

KEDO has developed draft procurement guidelines for carrying out its purposes and functions.<sup>3</sup> The guidelines require KEDO to utilize fair and open competition, to the maximum extent practical and, according to KEDO, are based on the contracting policies and practices of the U.S. government and commercial concerns. According to KEDO, the guidelines were developed by outside legal counsel with input from KEDO’s (1) General Counsel, (2) senior contract specialist, and (3) Executive Board.<sup>4</sup> The draft guidelines are expected to be finalized later this year.

As of April 1, 1997, KEDO had contracted for a wide range of services, including legal, banking, and architect and engineering services.<sup>5</sup> In January 1996, KEDO initiated a competitive procurement to obtain legal services. According to KEDO, 13 law firms from Europe, Japan, South Korea, and the United States responded. KEDO selected Freshfields—an international firm with offices worldwide—as its lead counsel for the reactor project, including nuclear liability issues. KEDO also retained Covington and Burling of Washington, D.C., to provide legal advice on,

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<sup>1</sup>“Agreement on the Establishment of the Korean Peninsula Energy Development Organization.”

<sup>2</sup>KEDO does not make a distinction between the terms “agreement,” “contracts,” and “other arrangements, including loan arrangements.” Instead, according to KEDO, the terms are intended to cover all possible contractual arrangements.

<sup>3</sup>The draft guidelines are entitled “Procurement Rules And Regulations for Contracts entered into by the [KEDO] Organization.”

<sup>4</sup>At the conclusion of our review, the Executive Board was composed of representatives from each of the three founding members—Japan, South Korea, and the United States. KEDO plans to add the European Atomic Energy Community to its Executive Board.

<sup>5</sup>As agreed with the requester’s staff, we did not review KEDO’s contracting actions in detail.

among other matters, general liability issues and issues arising from the organization's status as an international organization. Following KEDO's request for proposals from 13 Japanese, South Korean, and U.S. banks with offices in New York City, KEDO contracted with three banks—the Bank of Tokyo-Mitsubishi; the Korean Exchange Bank; and, a U.S. bank, Citibank—to, among other things, accept deposits of contributions from member and nonmember governments in support of the organization's activities. Finally, KEDO evaluated five proposals for architect and engineering services and selected Duke Engineering and Services—a U.S. subsidiary of the Duke Power Company<sup>6</sup>—to provide technical support for the reactor project. Duke Engineering and Services is responsible for, among other things, assisting KEDO in contract matters such as the development and negotiation of the prime contract for supplying the reactors.

KEDO also relies on contractors to supply heavy fuel oil to North Korea. As of April 1, 1997, KEDO had contracted with eight such vendors and was planning to initiate a contract to secure a broker for the 1998 oil deliveries.<sup>7</sup> According to KEDO, it purchases heavy fuel oil using open worldwide invitations for bids.<sup>8</sup> KEDO evaluates the bids to determine the best overall price and, according to KEDO, has awarded all of the contracts to the low bidder when transportation and the commodity costs are considered. According to KEDO, the process follows the standard offer and acceptance process used by commercial and U.S. government entities. Also, according to KEDO, all awards have been made on a fixed-price basis at prices comparable to the worldwide market price for the grade of oil purchased.

As of April 1, 1997, KEDO had also awarded numerous contracts for the purchase, delivery, installation, and maintenance of meters to monitor the flow of heavy fuel oil at six North Korean thermal power plants where the oil is consumed. Other KEDO contracts were for printing, accounting, and interpreter services.

According to KEDO, the prime contract with the Korea Electric Power Corporation (KEPCO) is the largest contract KEDO will award, both in terms of complexity and price. The agreement between KEDO and North Korea

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<sup>6</sup>The Duke Power Company is a major U.S. utility with international experience in managing the design, construction, and operation of nuclear power plants.

<sup>7</sup>The eight heavy fuel oil vendors are: Global Petroleum Corp., Itochu Hong Kong Ltd., Honam Oil Refinery Co., Vital Asia Ltd., BP Oil., Sun Kyung Corp., Han Wha Corp., and Mitsubishi Corp.

<sup>8</sup>According to KEDO, it also follows the standards set forth in the U.S. Federal Acquisition Regulation to ensure that all contractors in the free world are given a fair and equal opportunity to compete for the oil deliveries.

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**Appendix III**  
**Contracting Arrangements and Actions**  
**Arising From the Agreed Framework**

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for supplying the reactors (supply agreement)<sup>9</sup> specifies that the reactors will be an advanced version of a U.S. designed reactor currently under production. The supply agreement further requires KEDO to select a prime contractor to provide the reactors—on a turnkey basis—and to conclude a commercial supply contract with the prime contractor.<sup>10</sup> KEDO selected the Korean standard nuclear power plant, a pressurized water reactor modified by KEPCO, and in March 1996, KEDO formally designated KEPCO as the prime contractor for the project.<sup>11</sup>

KEDO's first annual report, dated July 31, 1996, stated that active negotiations between KEDO and KEPCO on the prime contract would begin in August 1996, followed by a fully executed contract in the first quarter of 1997. While negotiations are ongoing, KEDO does not expect the contract will be executed until 1998. According to KEDO, various factors contributed to the contract's delay, including the uniqueness and complexity of the project and general delays associated with KEDO's inability to access the reactor site following North Korea's September 1996 submarine incursion into South Korean waters. As discussed later, KEDO plans to execute a preliminary works contract so that the initial infrastructure work at the reactor site can begin while negotiations continue on the prime contract.

The contents of the prime contract will not be known until the contract is finalized. However, according to KEDO, the contract will be modeled on the "Orange Book," which KEDO describes as the leading international model for turnkey contracts.<sup>12</sup> This model is intended to simplify contract preparation and includes recommended text on 160 contract clauses considered generally applicable to turnkey contracts.<sup>13</sup> The Orange Book also provides guidance on other contract clauses that may need to be

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<sup>9</sup>"Agreement on Supply of a Light-Water Reactor Project to the Democratic People's Republic of Korea [North Korea] Between the Korean Peninsula Energy Development Organization and the Government of the Democratic People's Republic of Korea."

<sup>10</sup>A "turnkey" contract obligates the contractor to provide a fully equipped facility that is ready for operation (at the turn of a key). Turnkey contracts typically include design, construction, fixtures, fittings, and equipment and may include a requirement for the contractor to operate the facility—the reactors in this case—for a specified period of time. The other type of contract is a "Design-Build" contract. According to KEDO, most international infrastructure projects now use the turnkey contract model.

<sup>11</sup>KEPCO is a partially state-owned South Korean utility with experience in the construction, operation, and maintenance of Ulchin 3 and Ulchin 4—the nuclear reactor model selected for North Korea.

<sup>12</sup>The full name of the Orange Book is "Conditions of Contract for Design-Build and Turnkey." The book was published in 1995 by the Federation Internationale Des Ingenieurs-Conseils—an international federation of consulting engineers. According to the Federation, it includes members from more than 60 countries, including members from most of the independent consulting engineers in the world.

<sup>13</sup>The generally applicable clauses cover topics such as design; staff and labor; plant, materials, and workmanship; contract price and payment; claims; and disputes and arbitration.

modified to reflect the particular circumstances of the contracting parties. Taken together, the contract clauses are intended to govern the rights and obligations of the contracting parties.

According to KEDO, its outside legal counsel—experts in contracting for international infrastructure and construction projects—advised KEDO to select the Orange Book model for its prime contract with KEPCO for several reasons. First, the model’s terms are viewed as being the most favorable to the interests of the owner of a major international construction project—KEDO’s position in the prime contract. Second, the model has been used to draft many construction contracts for international infrastructure projects. Third, the model is well regarded by major multilateral lending institutions, in particular, the World Bank, the European Bank for Reconstruction and Development, and the Asian Development Bank. Finally, according to KEDO, the Federation has a strong record and considerable prior experience in developing standard form contracts in other areas, for example, civil works projects.

We reviewed the contract clauses in the Orange Book as well as the model’s suggested modifications for tailoring contracts to specific situations. The clauses address major contracting issues which, if properly tailored, should protect KEDO’s interests.

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## **Details on KEPCO’s Contracting Are Not Yet Available**

The details of KEDO’s prime contract with KEPCO will not be known until the contract is finalized. Among the issues still being negotiated are details on how KEPCO’s procurement (subcontracting) will be handled. In general, according to KEDO, because the prime contract is a turnkey contract, KEPCO must manage its procurement using its internal contracting rules and procedures and within the total price agreed upon between the parties.<sup>14</sup> However, KEDO plans to negotiate a set of general procurement principles applicable to KEPCO’s subcontracting on the “appropriate portion” of the reactors’ “balance of plant” equipment.<sup>15</sup> The general principles for KEPCO’s subcontracting are as follows:

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<sup>14</sup>We attempted to obtain information on KEPCO’s contracting policies and procedures from KEDO. However, according to KEDO, it does not have such information.

<sup>15</sup>According to the State Department, balance of plant equipment for the North Korean reactors refers to all equipment and materials purchased by KEPCO to complete the reactors with the exception of the reactors’ turbine generators and nuclear steam supply systems. The nuclear steam supply is the combination of all systems needed to produce the steam that drives a reactor’s turbine-generator for the production of electricity. Combustion Engineering, Inc.—a U.S. company—supplies a large portion of the system’s equipment for KEPCO.

- Companies based in KEDO member countries will be able to participate in a fair and open procurement process in the form of competitive bidding on the appropriate portion of the reactors' balance of plant equipment.
- All companies prequalified by KEPCO will be provided timely and adequate notification regarding the bidding process for all appropriate subcontracts and an equal opportunity to bid on the subcontracts.
- KEPCO, in consultation with KEDO, will establish the bidder prequalification criteria in consideration of each bidder's technical capabilities, performance history, relevant experience, financial condition, and quality assurance capability.
- Objective criteria will be established as determined by KEPCO, in consultation with KEDO, for evaluating bids tendered for appropriate subcontracts, including (1) the bidder's proposed price and conformance of the technical proposal to the purchase specifications; (2) the proposed quality, delivery schedule, and work plan; and (3) the magnitude of the contribution to KEDO of a member country in which the bidder is based and the magnitude of the subcontracts already awarded to companies from that member country.
- Before the expiration of a bid, KEPCO will award the relevant subcontract to the bidder whose bid has been evaluated to be the lowest priced among the most qualified bidders, based on the objective criteria.
- The procurement process will be agreed upon between KEDO and KEPCO and conducted by KEPCO.

According to KEDO, the Orange Book envisions that the contractor will be responsible for subcontracting and for the performance of its subcontractors. KEDO intends to follow the model's subcontracting clause. However, KEDO indicated that it will need to modify the clause to accommodate its general procurement principles. According to KEDO, its Executive Board will have the opportunity to approve relevant KEPCO subcontracting principles as part of its approval of the prime contract.

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## **Use of Limited-Scope Contracts to Perform Site Work**

According to KEDO, the draft prime contract provides KEDO and KEPCO flexibility to enter into interim and limited-scope contracts for preliminary site preparation work and for reactor components that must be ordered early. Thus far, KEDO and KEPCO have executed one contract of this nature and another is being negotiated.<sup>16</sup>

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<sup>16</sup>We attempted to obtain information on KEPCO's subcontracting actions, including the number, type, purpose, dollar amount, selection criteria, and the vendors' country of origin. However, according to KEDO, KEDO does not have such information.

In January 1996, the parties executed a contract for preproject services which enabled KEPCO to begin topographical survey work at Sinpo—the proposed site for the reactors. The contract’s statement of work required KEPCO to, among other things, (1) prepare a topographical survey and maps; (2) conduct a preliminary geological investigation; (3) prepare a preliminary site plan; (4) prepare a top-level schedule, including key milestones; and (5) prepare a “rough-order of magnitude” cost estimate for the entire project as of December 31, 1995. KEDO and KEPCO had anticipated that work under this contract would be accomplished on or before July 15, 1996. However, as of April 1, 1997, this contract was still being used to perform work at the site.

Negotiations are underway on a second contract between KEDO and KEPCO—the preliminary works contract. According to KEDO, the preliminary works contract is intended to ensure that physical work on the project can get underway at an early date—before the prime contract is executed.<sup>17</sup> According to KEDO, negotiations on the contract began in September 1996 because of delays in negotiating the prime contract and the desire to show progress at the site. However, as of April 1, 1997, the contract had not been finalized. According to KEDO, with the exception of establishing an office, KEPCO cannot begin any physical work in North Korea until this contract is approved.

According to State Department officials, work under the preliminary works contract is expected to begin in mid-1997. KEDO and KEPCO anticipate that the work will cost up to \$45 million and take up to 12 months to complete. As currently negotiated, KEPCO would provide the initial infrastructure and site development services, including (1) temporary support facilities such as water and community facilities, housing, and other facilities such as a store, a restaurant, and a first-aid facility; (2) diesel storage tanks, a gas station, a temporary construction office (including warehouse), communication facilities, a repair shop for heavy equipment, a temporary power supply and lighting facilities for the site and housing area; and (3) contingency planning for the communication facilities, including establishment of a project site communication services office; and (4) mobilization of the personnel, material, and equipment needed for the reactors’ subsequent construction period. The actual scope of work as well as the cost and duration of the site infrastructure work are subject to ongoing negotiations between the parties.

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<sup>17</sup>According to KEDO, this work would normally be included in the prime contract.

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# Status of Actions to Normalize Economic and Political Relations Between the United States and North Korea

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The Agreed Framework between the United States and North Korea provides that the two countries will take steps to normalize their economic and political relations. Specifically, the countries agreed to (1) reduce barriers to trade and investment; (2) exchange liaison offices—the lowest level of diplomatic representation; and (3) upgrade their relations to the Ambassadorial level, as progress is made in resolving issues of concern to each side.<sup>1</sup>

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## Modest Improvements in Economic Relations Between the United States and North Korea

For well over four decades, North Korea has been the target of a comprehensive array of sanctions imposed by the United States under the Trading With the Enemy Act (50 U.S.C. App. §§ 1-44) that prohibits U.S. businesses and other entities subject to U.S. jurisdiction from engaging in commercial trade with North Korea. In 1950, following North Korea's attack on South Korea, the United States imposed an embargo on trade and financial relations with North Korea. The embargo consisted of a general ban on U.S. commercial and financial transactions with North Korea. Under the embargo, transactions with North Korea are allowable only if they are authorized by regulations implementing the act, or are specifically licensed by the U.S. Department of the Treasury or the U.S. Department of Commerce.<sup>2</sup> The embargo also blocked North Korean assets held in financial institutions subject to U.S. banking regulations. In addition to the general trade embargo, the United States has statutorily imposed other types of restrictions and prohibitions on specific aspects of trade, export credits, and private investments with North Korea.<sup>3</sup>

Under the Agreed Framework, the United States and North Korea agreed, that within 3 months of its signing, they would reduce barriers to trade and investment, including restrictions on telecommunications services and financial transactions. In January 1995, the United States announced that it had taken incremental steps to ease economic sanctions against North

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<sup>1</sup>Issues of concern to the United States include (1) obtaining North Korea's cooperation in finding and returning the remains of U.S. soldiers "missing in action" from the Korean War, (2) halting North Korea's ballistic missile development and exports to countries of concern, (3) reducing the threat of North Korea's conventional military force buildup near South Korea, (4) seeking a credible condemnation of terrorist activity by North Korea, and (5) seeking improvements in North Korea's human rights record.

<sup>2</sup>Treasury, together with Commerce, implements the embargo against North Korea.

<sup>3</sup>Examples of such restrictions include a prohibition of credits through the U.S. Export/Import Bank, denial of preferential (Most Favored Nation) tariff rates, and specific penalties imposed on U.S. persons or entities engaging in business with countries, such as North Korea, which have been determined to be supporters of international terrorism.



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**Appendix IV  
Status of Actions to Normalize Economic  
and Political Relations Between the United  
States and North Korea**

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Korea in these areas.<sup>4</sup> The following month, the Treasury Department's Office of Foreign Assets Control (OFAC)—its office that administers the embargo against North Korea—amended its regulations to specifically authorize:<sup>5</sup>

- transactions related to telephone and telecommunications connections between the United States and North Korea;
- credit card use by Americans for personal travel to North Korea, other U.S. travel-related transactions, and travel-related transactions for North Korean nationals in the United States;
- financial transactions associated with opening of U.S. news offices in North Korea, and North Korean news offices in the United States, subject to OFAC's approval of a specific license;
- financial and other related transactions incident to the import or export of certain informational materials—compact disks, CD ROMs, artworks, and news wire feeds;<sup>6</sup>
- North Korea's use of the U.S. banking system to clear financial transactions involving U.S. dollars, provided that persons subject to U.S. jurisdiction cannot be originators or ultimate beneficiaries of funds transfers;
- the case-by-case release of certain funds held in U.S. financial institutions, subject to OFAC licensing, provided that no funds are released to North Korea or its nationals;
- U.S. imports, subject to a specific OFAC license, of North Korean-origin magnesite or magnesia—minerals used in domestic steel production;
- financial transactions related to the establishment and operation of a U.S. liaison office in North Korea, and a North Korean liaison office in the United States; and
- other financial transactions, subject to OFAC licensing, for U.S. firms participating in energy sector projects connected with North Korea's transition to light-water reactor power plants, including the supply of alternative energy (heavy fuel oil) and the disposition of the spent nuclear fuel removed from North Korea's 5-megawatt electric (MW(e)) nuclear power reactor.

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<sup>4</sup>In January 1995, North Korea's Korean Central News Agency announced that the North Korean government had lifted trade restrictions on imports of U.S. products and calls by U.S. vessels into North Korean ports. We were unable to verify these actions.

<sup>5</sup>Foreign Assets Control Regulations (31 C.F.R. part 500), as amended.

<sup>6</sup>Some information-related items—such as publications and films—were exempted from the embargo prior to the Agreed Framework. Treasury's amended regulations expanded the list of exempted items to include the above informational materials.

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**Appendix IV  
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Effective on April 7, 1997, Treasury also amended its regulations to authorize payments to North Korea for services rendered by the North Korean government in connection with U.S.-registered aircraft, or aircraft controlled or owned by persons subject to the jurisdiction of the United States, that fly over North Korean airspace or make emergency landings in North Korea. While authorized, according to the State Department, U.S. overflights and landings in North Korea have not yet taken place.

According to State Department officials, North Korea asserts that the United States has not gone far enough in fulfilling its economic commitments to North Korea under the Agreed Framework.<sup>7</sup> According to State officials, the United States does not intend to relax its trade restrictions with North Korea further until additional progress is made by North Korea in addressing issues of concern under the Agreed Framework. (The issues of concern are discussed later in this app.)

The following sections provide information on the impact of Treasury's amended trade regulations with North Korea, and to the extent available, information about any resulting trade associated with the regulatory changes.

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**Telecommunications and  
Information-Related  
Transactions**

Following Treasury's actions to ease trade restrictions, in February 1995, the AT&T Corporation applied for and received approval from the Federal Communications Commission to offer international, long-distance telephone service between the United States and North Korea. On April 10, 1995, AT&T launched its long-distance service, including direct-dial service between U.S. cities and Pyongyang, and operator-assisted service to calls placed outside of Pyongyang. The services are subject to some limitations; for example, collect calls cannot be made to or from North Korea, and North Korean directory assistance is not available.

In addition, Treasury's amended regulations authorize, without limitation, the export to North Korea of U.S. information and informational materials, such as books, magazines, films, compact disks, CD ROMs, artworks, news wire feeds, and recordings. The regulations also permit U.S. travelers returning from North Korea to bring back \$100 worth of North Korean merchandise for personal use and an unlimited quantity of North Korean-origin informational material.

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<sup>7</sup>We were unable to obtain details about North Korea's position on this matter.

Treasury officials told us that they do not maintain records on telecommunications and informational transactions with North Korea.<sup>8</sup> Accordingly, we were unable to obtain the estimated value of these transactions since the signing of the Agreed Framework.

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## **Travel-Related Transactions**

Treasury's amended regulations allow U.S. citizens traveling to and from North Korea to engage in financial transactions that are incident to their travel in North Korea. Furthermore, U.S. travel service providers are authorized to organize group travel to North Korea, including transactions with North Korean carriers. However, individuals may only spend money in North Korea to purchase travel-related items such as hotel accommodations, meals, and goods for personal consumption. Also, Treasury's amended regulations remove a \$200-per-day limitation on travel expenses for U.S. citizens traveling in North Korea and authorize U.S. citizens to use their credit cards for their travel-related transactions there.

Neither State nor Treasury could provide us with information on the amount of U.S. travel-related expenses incurred in North Korea, since the relaxation of the regulations. However, according to a State Department official, North Korea has not yet begun to accept credit cards drawn on U.S. banks because it fears that the transactions might be blocked. Also, according to Treasury officials, currently, major U.S. credit card firms do not accept transactions that originate in North Korea.

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## **Other Types of Financial Transactions**

Prior to Treasury amending its regulations, it had blocked, or frozen, \$20.6 million in North Korean-related financial transactions. According to Treasury officials, most of these transactions occurred in the late 1980s and early 1990s, when Treasury developed a means of detecting and monitoring suspicious foreign payments involving U.S. dollars. Treasury's amended regulations allow blocked funds to be released under specific conditions. Nevertheless, the funds cannot be released to North Korea, its entities, or any person located in North Korea. According to Treasury Department officials, as of mid-May 1997, 52 transactions totaling \$6.1 million were released—no funds were released to North Korea or its

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<sup>8</sup>Commerce officials from the Bureau of Export Administration told us that it has authorized two licenses to North Korea for exports related to telecommunications. We could not obtain further details about these transactions.

nationals. Treasury has no immediate plans to release the remaining \$14.5 million in blocked North Korean funds.<sup>9</sup>

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## News Organization Offices

Treasury's amended regulations authorize the issuance of specific licenses for transactions related to the establishment and operation of U.S. news bureaus in North Korea. Transactions that may be authorized, include (1) leasing office space and securing goods and services in North Korea, (2) hiring North Korean nationals to serve as support staff, (3) purchasing North Korean goods for the office, and (4) paying fees for the operations of the office. Similarly, if licensed by Treasury, North Korean organizations can establish and operate news agencies in the United States. Since late 1994, Treasury officials told us that they have neither licensed any U.S. news organizations to set up operations in North Korea, nor authorized North Korean news bureaus to set up operations in the United States.<sup>10</sup>

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## Magnesite/Magnesia Trade

As of mid-April 1997, the Treasury Department had licensed four U.S. companies to import quantities of magnesite or magnesia—materials used in domestic steel production—from North Korea.<sup>11</sup> Treasury issued the first license on March 8, 1995. The license authorized a U.S. company to import up to 100,000 metric tons of magnesite from North Korea. In June 1995, North Korea and the U.S. firm contracted for the import of 85,000 metric tons of magnesite at an estimated cost of between \$5 million to \$10 million. The license, extended twice, is valid through December 1997, and authorizes the U.S. firm to import up to 200,000 metric tons of magnesite or magnesia.

Also, since 1995, three other firms were awarded licenses by Treasury. Two of these licenses are still in effect. One license, approved in November 1996, authorizes the import of up to 200,000 metric tons of magnesia over an indefinite period of time. A second license, approved in April 1995, authorized the import of up to 80,000 metric tons of magnesia until December 1995. This license was subsequently extended through December 1997. The third license, which has expired, was approved in August 1995. The license authorized 50,000 metric tons of

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<sup>9</sup>Treasury officials told us that they normally consult with the State Department prior to any decision to release funds that remain blocked.

<sup>10</sup>Commerce officials said that its Bureau of Export Administration has licensed one U.S. firm to export goods to North Korea related to news bureaus.

<sup>11</sup>China and North Korea are the primary natural sources of these materials on the world market.

magnesite/magnesia through August 1996. We could not obtain details on these transactions.

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## **The Light-Water Nuclear Reactor Project**

Because of the embargo against North Korea, U.S. products, technology, or services generally cannot be exported to North Korea, either directly or indirectly.<sup>12</sup> Treasury's amended regulations, however, permit OFAC to grant licenses to U.S. persons or entities to participate in transactions that further activities related to the Agreed Framework, including the design of reactors; site preparation and excavation; delivery of essential nonnuclear components, including turbines and generators; building construction; the disposition of the spent nuclear fuel from North Korea's 5-MW(e) reactor; and the provision of heavy fuel oil for heating and electricity in North Korea.

To date, Treasury has approved a broad license for KEDO—the international consortium established to carry out the Agreed Framework's provisions—and nine licenses authorizing firms under contract with KEDO to do business in North Korea. The nine licenses authorize:

- two U.S. companies and a U.S. individual to provide support services to KEDO,
- a U.S. financial institution to provide banking services to KEDO,
- a U.S. firm to assist in the site survey and preparation at the reactors' site,
- three U.S. firms to engage in transactions related to the delivery of heavy fuel oil to North Korea, and
- one U.S. firm to monitor North Korea's usage of heavy fuel oil provided under the Agreed Framework.

Furthermore, any export of U.S. materials or technology necessary to implement the Agreed Framework must be licensed by the Commerce Department's Bureau of Export Administration. Since October 1994, Commerce has not approved any licenses for the export of goods and services to North Korea related to the light-water nuclear project with respect to KEDO. However, Commerce has approved 10 licenses, including 8 associated with the cleanup of the North Korean spent fuel and 2 associated with the alternative heavy fuel oil.

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<sup>12</sup>This general prohibition also affects individuals dealing in or assisting in the sale of goods or commodities to North Korea.

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## **The United States Is Prepared to Open a Liaison Office in North Korea Once Issues Between the Parties Are Resolved**

North Korea was established as a separate country in 1948, but the United States has never established a formal political relationship with North Korea. With the signing of the Agreed Framework, a step was taken towards eventually establishing formal diplomatic relations between the United States and North Korea—a pledge by the two countries to open liaison offices in each others' capital.<sup>13</sup> According to State Department officials, establishing liaison offices would provide practical benefits for both countries. For example, liaison offices afford countries the ability to protect and support its citizens while in each others' country. Furthermore, from the U.S. point of view, an office in Pyongyang would provide the United States with first-hand knowledge of the situation in North Korea and provide improved access to North Korean officials.

In December 1994, the United States and North Korea met to discuss the establishment of liaison offices. The meeting resulted in a draft agreement on consular matters which, among other things, would allow the staff of each liaison office access to local authorities for citizens arrested or detained while traveling in that country. In January 1995, North Korea informed the United States that it wished to modify certain provisions of the agreement. According to publicly available information, North Korea wanted to change the method for passing diplomatic pouches in and out of North Korea. The United States objected, insisting that any modification of the agreement, would require further negotiations between the parties.

According to State Department officials, subsequent negotiations to resolve the impasse were delayed by numerous incidents, including (1) the February 1995 arrest and detention of a U.S. military crewman after his helicopter crashed in North Korea, (2) the August 1996 apprehension and detention of a U.S. citizen of Korean descent who crossed into North Korea from China, and (3) the September 1996 incursion of a North Korean submarine into South Korea.

State Department officials told us that outstanding issues regarding the liaison offices were briefly discussed in a series of meetings between the United States and North Korea earlier this year.<sup>14</sup> A key issue remaining to be resolved is the transit and passage of diplomatic pouches between the countries. However, according to State officials, most of the other

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<sup>13</sup>In general, liaison offices are the lowest level of diplomatic representation between countries. The United States has maintained such low-level offices in countries with which it has no diplomatic relations. For example, the United States maintained a liaison office in the People's Republic of China from 1973 until 1979, when it upgraded diplomatic relations with China.

<sup>14</sup>The State officials declined to provide us with information about the status of the negotiations or the expected time frame for opening the liaison offices.

essential details related to the establishment of the offices have been resolved. For example, the United States has arranged for the supply and support of an office in Pyongyang, and in March 1997, North Korean officials visited Washington, D.C., to identify, among other things, possible sites for its office.

According to State Department officials, the Department has developed a staffing plan and, in the fall of 1995, had set aside funds for the operation of a prospective liaison office in Pyongyang.<sup>15</sup> State officials plan to request six full-time positions, at a cost of \$1.5 million annually to staff and operate the office. Given the uncertainty about planning for the office's opening, the officials said that State will probably need to request congressional approval to reprogram funds for the office's start-up. Once outstanding issues are resolved between the parties, a State official estimated that the U.S. liaison office could begin operating within about 3 to 6 months, assuming congressional approval.

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## Limited Progress in Resolving Bilateral Issues of Concern

The Agreed Framework states that the United States and North Korea will upgrade their relations to the Ambassadorial level once progress on resolving issues of concern to both parties is made. The Agreed Framework does not identify what the issues are between the United States and North Korea. According to State Department officials, however, there are five specific areas related to the Agreed Framework that the United States has sought to discuss with North Korea:

- Progress in recovering and returning to America the remains of missing U.S. soldiers who died while serving in the Korean War.
- A halt to North Korea's indigenous development, deployment, and export of offensive ballistic missiles.
- A reduction in the threat posed to South Korea by North Korea's conventional military forces.
- The cessation by North Korea of engagement in, and sponsorship of, acts of international terrorism.
- Reforms by the North Korean government in dealing with domestic human rights issues.

According to the State Department, efforts to normalize U.S. relations with North Korea will be done carefully and sequentially as progress is made on the issues that, according to the United States, have troubled the Korean

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<sup>15</sup>The United States has chosen a site for a liaison office in Pyongyang, North Korea. Present U.S. plans are to share facilities with the German delegation.

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Peninsula for years. In January 1995 testimony before the Congress, the former Secretary of Defense said that the United States did not expect any of the issues separating the United States and North Korea to be resolved quickly.<sup>16</sup> Instead, the Secretary said that the Agreed Framework serves as a vehicle to start a dialogue with North Korea on issues of concern that, over time, would increase the likelihood that these points of contention between the two countries would be resolved.

A discussion of each issue and, where applicable, progress towards resolving each issue follows.

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**Progress in Accounting for  
the Remains of U.S.  
Soldiers Missing in Action  
From the Korean War**

According to the Department of Defense, over 8,100 American service personnel were unaccounted for from the Korean War.<sup>17</sup> In 1954, following the end of the war, the North Korean government returned the remains of 1,868 American soldiers to the United States. Until this decade, further efforts to recover and identify the remains of American soldiers were largely unsuccessful. In 1990 and 1991, North Korea recovered and returned a total of 16 remains to two Members of Congress visiting the North. In 1992, North Korea turned 30 more remains over to the United Nations Command—one of the signatories to the 1953 Armistice agreement. From July 1993 through September 1994, North Korea returned to the Command an additional 162 sets of remains, for a total of 208.

During the 1990s, several noteworthy events affected the pace and progress of U.S. efforts to account for U.S. soldiers missing in action from the Korean War. In an August 1993 written agreement, the United Nations Command and North Korea's "Korean People's Army" recognized the importance, for humanitarian reasons, of cooperating on the recovery, return, and identification of missing soldiers in the North. That same month, the United States—through the Command—paid North Korea \$897,000 for recovery activities associated with the first 46 sets of remains returned between 1990 and 1992. The following year, the late Kim Il

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<sup>16</sup>According to State Department officials, North Korean issues of concern include (1) lifting the complete regime of U.S. economic sanctions against North Korea, (2) withdrawing U.S. military troops from South Korea, and (3) providing North Korea with additional food assistance. However, according to the officials, North Korea has not identified these or other issues as impediments to upgrading diplomatic relations between the countries. We were unable to obtain North Korea's views on this matter.

<sup>17</sup>According to a Defense Department official, because of discrepancies in U.S. war casualty records, an official count of U.S. soldiers missing in action from the Korean War is not currently available. The official said that the number 8,177 has been widely used as the total for U.S. military personnel missing from the war, but this figure is not reliable. The official also said that the U.S. Army is reconciling records of missing Korean War soldiers from three databases and that it hopes to have a more accurate count on missing U.S. soldiers in the near future.



Sung—then President of North Korea—informed former President Carter that North Korea would permit joint U. S./North Korean recovery teams. According to a Defense Department official, the North Korean commitment led to cautious optimism about the possibility that increased progress could be made in the accounting for missing U.S. soldiers. Progress towards this goal, however, was delayed by a disagreement between the United States and North Korea over the amount of compensation that would be paid to North Korea for its recovery of the 162 sets of remains returned in 1993 and 1994.

Over the next 2 years, the impasse over the compensation issue continued. The United States and North Korea met in January 1996 at the U.S. Army's Central Identification Laboratory in Hawaii to discuss past and present issues related to the recovery of U.S. soldiers missing in action. The January 1996 talks failed to produce an agreement on the appropriate amount of compensation to North Korea for the 162 remains. However, according to Defense Department officials, the meeting was valuable because it demonstrated to the North Koreans the advantages of conducting joint search and recovery operations with the two sides' militaries and convinced the North about the desirability of future talks. Finally, a breakthrough on the compensation issue occurred at a May 1996 meeting in New York City between the United States and North Korea. Specifically, North Korea agreed to accept \$2 million for the 162 remains. Also, in the meeting, the United States and North Korea agreed to meet the following month to discuss the specific timing, sites, personnel, and other issues related to the first joint recovery mission.

In June 1996, the parties held follow-on discussions in Pyongyang, and they agreed that U.S. and North Korean military officials would conduct two joint recovery missions—one in July 1996 and one in September 1996—with each to last 20 days. The parties also agreed that the two missions would take place at two North Korean sites where U.S. planes were believed to have crashed. In addition, the United States agreed that it would reimburse North Korea for its costs of each mission, consistent with existing U.S. military procedures. According to State Department and Defense officials present at these negotiations, the meeting produced other positive benefits. For example, for the first time since the Korean War, U.S. and North Korean military officials agreed to negotiate directly with each other over the terms and conditions of future recovery operations. Also, the officials said that the meetings set the stage for proceeding with future joint recovery missions based strictly on

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humanitarian considerations, rather than as an adjunct to progress on other bilateral issues of concern.

According to the Departments of Defense and State, the first joint recovery operation proceeded as planned, lasting from July 9, 1996, through July 29, 1996. As a result of this mission, one American soldier's body was recovered and returned to the U.S. Army's laboratory in Hawaii, where a positive identification was made. The U.S. Army paid the costs of the first joint recovery mission, including about \$96,000 in compensation to the North Koreans.<sup>18</sup> With the additional set of remains returned, this increased the count of remains returned since 1990 by North Korea to the United States to 209.<sup>19</sup>

Plans for the second joint recovery operation in September 1996 did not materialize due to the controversy surrounding the North Korean submarine incursion into South Korea that month. According to State and Defense Department officials, further negotiations on the return of U.S. remains were put on hold until after December 29, 1996, when North Korea expressed its deep regret over the incident.

Talks about future joint recovery missions between the United States and North Korea have resumed, and on February 25, 1997, the Defense Department wrote to the Korean People's Army requesting its cooperation in continuing the missions. The United States also requested North Korea's cooperation in obtaining access to North Korean War archives and museums to learn more about the fate of U.S. soldiers last known to be alive in prisoner-of-war camps. According to the Defense Department, this type of information will help facilitate subsequent recovery operations. The Department of Defense's Deputy Assistant Secretary of Defense for Asian and Pacific Affairs, testified before the House of Representatives, on February 26, 1997,<sup>20</sup> that the United States hopes to complete the archival research with North Korea before undertaking additional joint recovery missions.

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<sup>18</sup>The \$96,000 includes the cost of food for North Korean personnel and fuel for U.S. vehicles used in the mission. In addition, the U.S. Army incurred costs of \$236,000 for travel and transportation, as well as \$475,000 in annual costs to lease and store the vehicles and equipment used for the joint recovery mission.

<sup>19</sup>According to U.S. Army officials at its Central Identification Laboratory in Hawaii, to date only 11 of the 209 remains have been positively identified as U.S. soldiers. However, efforts are continuing to investigate the North Korean-returned remains through new and existing anthropologic and forensic technologies, such as DNA matching.

<sup>20</sup>Statement by Dr. Kurt M. Campbell, Deputy Assistant Secretary of Defense (Asian and Pacific Affairs) before the Subcommittee on Asia and the Pacific, House Committee on International Relations.

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Related to this, the United States is continuing to seek answers from North Korea and other sources on reports of Americans allegedly detained and still alive in North Korea. To date, efforts to substantiate reports of Americans still alive in North Korea have been unsuccessful, according to Department of Defense officials. These officials maintain that over the years, the United States has received reports alleging that Americans are living in North Korea. However, the officials described these reports as mostly hearsay.

According to the Department of Defense officials, uncertainties remain about the number of Americans in North Korea, and whether they are prisoners of war or defectors. According to a January 1997 internal Defense memorandum, the Department believes that at least some of the reports of suspected Americans in North Korea may be linked to four former U.S. servicemen who defected to North Korea after the Korean War. The individuals are believed to be still alive. Other reports contain conflicting evidence; for example, some of the reports indicate that as many as 10 to 15 Americans were reportedly held in North Korea, while other reports, including those received by South Korean military intelligence, suggest that North Korea may harbor a group of 20 Americans other than the 4 known defectors. The memorandum also cites the account of an American who spent 5 years working at a North Korean university. The individual alleges that he heard second-hand reports about American prisoners of war still in the country. According to the memorandum, the North Korean government has consistently denied holding any American prisoners of war.<sup>21</sup>

At the end of our review, progress in accounting for U.S. soldiers missing from the Korean War was continuing. Specifically, according to a Defense Department official, in early April 1997, the North Korean government responded favorably to U.S. requests (1) for access to the North Korean War archives, (2) to resume joint recovery operations, and (3) to further discuss allegations of Americans living in North Korea. Talks on these subjects began on May 4, 1997. On May 15, 1997, the Defense Department announced that North Korea had agreed in principle to allow the United States to examine North Korean War archives and to conduct three joint recovery missions in 1997. There was no agreement reached on interviewing American defectors in North Korea, but both sides said that discussions would continue on this issue. The Department of Defense

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<sup>21</sup>In addition to the alleged sightings of living U.S. prisoners in North Korea, Defense Department officials have received other reports over the years alleging that some U.S. prisoners of war from Korea may have been moved to China or the former Soviet Union. To date, according to the Department, none of these reports have been substantiated.

hopes to conduct four joint recovery missions in fiscal year 1997 and included \$860,000 in its current budget for that purpose.

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### **Some Movement Towards Addressing U.S. Concerns About North Korea's Ballistic Missiles**

Since the early 1980s, according to the Defense Intelligence Agency, North Korea has spent millions of dollars annually to engineer and produce offensive ballistic missiles for its own use and for export to countries of concern in the Middle East.

In the early stages of its missile program, North Korea acquired single-stage SCUD B missiles from the former Soviet Union. North Korea later produced its own variant of the missile—called the SCUD C. According to an unclassified 1995 Defense Intelligence Agency report, the SCUD C can deliver a 700-kilogram warhead with a range of 500 kilometers compared with SCUD B's range of 300 kilometers. In addition, the SCUD C has an improved internal guidance system for greater accuracy. North Korea is believed to have installations of both types of missiles about 50 kilometers north of the demilitarized zone (DMZ),<sup>22</sup> and, according to a Defense Department report, several hundred of these missiles are believed to be available for North Korea's use.<sup>23</sup> The missiles are capable of reaching targets throughout South Korea. And, according to a Defense Department official, the missiles may be capable of delivering chemical and biological warheads. In addition to fixed launching installations, the North is reported to have mobile launching capabilities for its missiles.

The Defense Intelligence Agency reports that North Korea also has been working on other, longer-range missiles that are believed to be capable of delivering larger warheads than its existing SCUDs. One such missile, called the "No Dong," is reported to have a range of 1,000 kilometers or more and can deliver about a 40-percent heavier warhead than the SCUD C. According to a Defense Department official, the No Dong missile, which was believed to have been last flight-tested in 1993, can reach targets as far away as Japan. In November 1996, press accounts from the Far East reported that North Korea was about to resume No Dong testing, but the tests apparently were cancelled. However, recent Japanese and South Korean press accounts indicate that the North Koreans may be intending

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<sup>22</sup>The DMZ is the strip of land about 2.4 miles wide, running the entire length of the Korean Peninsula, established by the 1953 Korean Armistice Agreement as a buffer along the Military Demarcation Line between North and South Korea.

<sup>23</sup>Department of Defense Report on Weapons Proliferation in Northeast Asia, Office of the Secretary of Defense (Apr. 12, 1996).

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to further test these missiles soon. According to these reports in April and May 1997, North Korea has three missiles ready for immediate test-firing along its northeastern coast and plans to install seven more such missiles.

In addition to the No Dong missiles, the Defense Intelligence Agency reports that North Korea is working on other, longer-range designs, with two rocket stages. These missiles—called the Taepo Dong I and Taepo Dong II—are reported to be in the design stage of development. The Taepo Dong I is reported to have a range of more than 1,500 kilometers and the Taepo Dong II, a range of 4,000 kilometers or more. Testimony by a Central Intelligence Agency official last December before a Senate Select Committee indicated that the Taepo Dong II missile design may be capable of reaching Alaska or the westernmost parts of the Hawaiian Islands.<sup>24</sup> However, according to a Defense official, there are questions about the state of development and effectiveness of North Korea's missile program. Also, according to a 1997 report by the National Defense University's Institute for Strategic Studies,<sup>25</sup> U.S. intelligence had initially estimated that North Korea's longer-range missiles might become operational by the turn of the century, but the estimate has been since revised to reflect reports of slower progress in North Korea's development of these missiles.

Also, according to the National Defense University's report, North Korea is a key supplier of missiles and technology assistance to other nations of concern that have not yet perfected their own ballistic missile production capabilities. Specifically, North Korea is believed to have sold SCUD missiles to Iran and Libya and to have assisted Iraq and Syria with developing their missile programs, and North Korea may be helping Libya with its program.

Progress between the United States and North Korea on resolving the issue of missile proliferation has been limited. According to State Department officials, the United States and North Korea met in Berlin during April 1996 to discuss a freeze on North Korea's exports and production of missiles, and to encourage North Korea to become a member of the Missile Technology Control Regime—a multilateral

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<sup>24</sup>Testimony of John Mclaughlin, the Vice Chairman for Estimates of the National Intelligence Council, before the Senate Select Committee on Intelligence, (Dec. 4, 1996).

<sup>25</sup>Strategic Assessment 1997: Flashpoints and Force Structure, National Defense University/Institute for National Strategic Studies, Fort Lesley J. McNair, Washington, D.C.; 1997.

agreement established to restrict such exports.<sup>26</sup> According to State Department officials, the talks were useful; however, no agreement was reached. The countries agreed to meet at a later time, and on April 14, 1997, the State Department announced that the United States and North Korea would hold a second round of missile talks on May 12 and 13, 1997. However, the North Koreans subsequently postponed the talks for “technical” reasons.

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**Threat Posed by North Korea’s Conventional Military Forces Has Not Significantly Changed**

According to the State Department, the United States and North Korea have not yet discussed issues related to North Korea’s conventional military presence on the Korean Peninsula. North Korea, with a population of only about 24 million people, fields the world’s fifth-largest military, with a combined active force of over 1.1 million, and another 4.7 million reservists. The large, heavily armed and forward positioned, military forces of North Korea’s Korean People’s Army continues to pose a serious threat to South Korea and the approximately 37,000 U.S. forces stationed there.<sup>27</sup> Furthermore, according to the Department of Defense, North Korea remains a source of unpredictability and potential danger to the entire East Asian/Pacific region.

Two-thirds of North Korea’s conventional military personnel are positioned within 60 miles of the DMZ. According to a Defense Department official, North Korea has continued to maintain a “forward leaning” military posture during this decade. Since the signing of the Agreed Framework, the official said, there has been no appreciable change in the troop placements by North Korea. This combined with North Korea’s deployment of over 10,000 pieces of artillery and placement of large concentrations of artillery and multiple rocket launchers in locations close to the DMZ poses a formidable risk to South Korea’s security. Some of these weapons are capable of striking Seoul, about 26 miles from the DMZ, with little advance warning, and could potentially inflict great damage and casualties on South Korea in the event of an attack.

In addition, the North Korean People’s Army possesses (1) a large cadre of well-trained special operations forces capable of being inserted behind

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<sup>26</sup>The United States and seven other countries formed the Regime in April 1987 to coordinate their national exports of certain goods and technologies so as to limit the proliferation of missiles and related technology. Since then, an additional 21 nations have joined the Regime, and 7 other countries adhere to the Regime’s guidelines.

<sup>27</sup>In contrast, South Korea maintains a total active military force of about 650,000 and reserves of over 2 million, while the United States presently has a combined force of about 37,000 stationed in South Korea and about 100,000 in the entire East Asian/Pacific region.

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South Korean lines, (2) a growing arsenal of missiles, and (3) the capability of using missiles and other means to deliver chemical and biological weapons. Finally, according to the National Defense University's Institute for Strategic Studies, North Korea's military doctrine, patterns of deployment, the structure of its military forces, and equipment all are designed for a rapid offensive thrust into South Korea.

According to Department of Defense and State Department officials, North Korea has done little to reduce its conventional force military threat against South Korea since the start of the decade. Despite signs of a badly deteriorating economy, years of poor harvests, and recent reports of widespread hunger, North Korea has continued to give priority to its military. The Central Intelligence Agency has estimated that between one-fourth to one-third of North Korea's gross domestic product is spent on its military. A Defense Department official said that up to the present, the North Korean military has been largely shielded from the worst effects of food shortages afflicting the country. But according to the National Defense University's study and the Department of Defense official, other factors such as shortages of fuel, North Korea's lack of hard currency, its poor international credit rating, and loss of backing by the former Soviet Union, all indicate a potential reduction in readiness by the North Korean forces.

While there is reason for military analysts to believe that overall North Korean military readiness may be on the decline, a Department of Defense official said that this does not affect North Korea's ability to inflict serious damage upon South Korea. The official said that it appears that North Korea continues to use its offensive military force posture as leverage in negotiations with the United States and South Korea and apparently does not want to give up this advantage.

According to recent statements by the Department of State and the Defense Department, the United States has no plans to decrease the 37,000 troops stationed in South Korea, which cost about \$2.5 billion annually to maintain, or to reduce the total 100,000-troop commitment for the East Asian/Pacific region. According to the Secretary of Defense, present-day U.S. troop reductions could have a destabilizing effect on the region, possibly upsetting the East Asian/Pacific regional military balance and triggering a dangerous arms race in the region.

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## **No Progress on Issues Related to North Korea's Suspected Involvement in Terrorist Activities**

North Korea is believed to have been engaged in and sponsored international acts of terrorism, and North Korea was added to the State Department's annual list of states supporting international terrorism in January 1988.<sup>28</sup> According to State and Defense Department officials, the action to add North Korea to its terrorism list followed North Korea's mid-flight bombing of a Korean Air Line passenger aircraft in 1987, killing all 115 people aboard. North Korea has since made several statements condemning terrorism and denies any involvement with international terrorist acts. For example, in November 1995, a North Korean spokesman said that North Korea opposed "all kinds of terrorism and any assistance to it." A similar statement was made in May 1994 when a North Korean Foreign Ministry spokesman indicated North Korea's opposition to "any act encouraging and supporting terrorism." According to the State Department, North Korea and South Korea pledged in 1991 to "refrain from all acts destroying and overthrowing the other side" and "not use arms against one another."

Despite North Korea's statements renouncing terrorism, North Korea is believed to be providing sanctuary for terrorists, such as members of the Japanese Communist League-Red Army Faction, who participated in the 1970 hijacking of a Japan Air Lines flight into North Korea. And, talks between North Korean and Japan on normalizing their diplomatic relations have been complicated by North Korea's refusal to respond to questions concerning the status of a Korean resident of Japan allegedly kidnapped by North Koreans in the 1980s. The individual is believed to have been kidnapped to teach Japanese to North Korean agents. Most recently, according to the State Department's 1996 report on global terrorism,<sup>29</sup> a senior member of the Japanese Red Army was arrested in March 1996 on counterfeiting charges. The individual was captured in Cambodia carrying a North Korean diplomatic passport and was in the company of several North Korean diplomats. State Department officials told us that at this time, they have no plans to remove North Korea from the list of terrorist nations.

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## **No Progress by North Korea in Addressing Human Rights Issues**

According to the State Department's annual report on international human rights practices for 1996, North Korea continues to deny its citizens fundamental human rights. As cited in the report, North Korea's state

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<sup>28</sup>Nations determined by the Secretary of State to have repeatedly supported acts of international terrorism are subject to certain U.S. trade or other restrictions.

<sup>29</sup>Patterns of Global Terrorism, 1996: Overview of State-Sponsored Terrorism, U.S. Department of State.



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leadership perceives most international norms of human rights, especially individual rights, as illegitimate and alien social artifacts subversive to the goals of the state and party. Also, North Korea's leadership appears determined to maintain tight ideological and political control of its people despite a sharp decline in its economy—brought about because of the collapse of the former Soviet bloc and food and material shortages.

The Department of State's human rights report calls attention to many areas in which North Korea's practices on human rights appear to substantially deviate from established international human rights conventions. For example, according to State's report:

- Citizens do not have the right to peacefully change their government.
- North Korea's Penal Code stipulates capital punishment and confiscation of all assets for a wide variety of "crimes against the revolution," including defection, attempted defection, slander of the policies of the party or State, writing "reactionary" letters, and possessing "reactionary" printed matter.
- North Korean constitutional provisions, which reportedly allow for an independent judiciary and fair trials, are not implemented in practice, and there are no restrictions on the ability of the North Korean government to detain and imprison persons against their will.
- Many North Korean citizens are held as political prisoners under harsh conditions, and prisoners reportedly are dying from torture, disease, starvation, or exposure.
- The North Korean government subjects its citizens to rigid controls, such as a prohibition of freedom of the press and association, and governmental intervention over all forms of cultural and media activities, such as radio and television.
- The North Korean government directs all significant economic activity, with only government-supervised labor unions permitted to exist, and workers do not have the right to strike.
- The North Korean government is believed to restrict freedom of religion, even though the country's 1992 Constitution provides for the freedom of religious belief, including the right to build buildings for religious use.
- North Korea restricts citizens' movements and internal and external travel, and its government tightly controls access to civilian aircraft, trains, buses, food, and fuel.

The State Department notes that because the United States does not have diplomatic relations with North Korea, and North Korea does not allow representatives of foreign governments, journalists, or other invited

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visitors freedom of movement, it is not possible to fully evaluate human rights conditions in the country. State acknowledges that the details of its human rights report on North Korea may be limited. However, according to State, it has updated the report's information wherever possible, and believes that its contents are indicative of the current human rights situation in North Korea.

North Korea continues to deny allegations that it has subverted the fundamental rights of its citizens. However, according to State officials, given their concern about North Korea's past record on human rights, North Korea will have to implement major reforms before it can substantially improve its standing with the United States on this issue.

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# Status of Actions to Promote Peace and Security on a Nuclear-Free Korean Peninsula

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The Agreed Framework provides that the United States and North Korea will work together for peace and security on a nuclear-free Korean Peninsula. Specifically:

- The United States will provide formal assurances to North Korea, against the threat or use of nuclear weapons by the United States.
- North Korea will consistently take steps to implement the 1992 North-South Joint Declaration on the Denuclearization of the Korean Peninsula.
- North Korea will engage in a dialogue with South Korea.

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## Assurances by the United States Regarding Nuclear Nonaggression Against North Korea

The Agreed Framework specifies that the United States will provide formal assurances to North Korea, against the threat or use of nuclear weapons by the United States. According to State Department officials, the United States does not intend to provide these assurances until North Korea comes into full compliance with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)—to which it has been a party since 1985. Specifically, before U.S. assurance will be provided, North Korea must implement the NPT-mandated nuclear safeguards pursuant to its safeguards agreement with the International Atomic Energy Agency (IAEA), including verification by IAEA of the completeness and accuracy of North Korea's initial report on the quantity of nuclear material in its possession.<sup>1</sup>

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## Actions to Implement the North-South Joint Declaration on Denuclearization

On January 20, 1992, South Korea and North Korea signed the “Joint Declaration on the Denuclearization of the Korean Peninsula.” The declaration indicated both parties’ desire to eliminate the danger of nuclear war and to create an environment favorable for peace and security in Asia and the world. For example, the declaration prohibited both sides from testing, manufacturing, producing, receiving, possessing, storing, deploying, or using nuclear weapons and forbade the countries from possessing nuclear reprocessing and uranium enrichment facilities. Furthermore, a procedure for inter-Korean inspections was to be developed and implemented, and a South-North Joint Nuclear Control Commission was to establish procedures and methods for the inspections.

According to the State Department, North Korea and South Korea held a series of meetings in early 1992 to discuss issues related to the implementation of the declaration. However, these meetings were

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<sup>1</sup>We will address the status of North Korea's compliance with the NPT and its safeguards agreement with IAEA, as related to its performance under part IV of the Agreed Framework in a report expected to be issued later this year.

unsuccessful in establishing a bilateral inspection regime. The meetings were subsequently discontinued as relations between the two Koreas worsened in March 1993, when North Korea threatened to withdraw from the NPT and refused to cooperate with IAEA's inspections of its nuclear facilities. Discussions have not yet resumed and, as a result, the 1992 declaration has not been implemented.

According to State, the Agreed Framework has several elements in common with the Joint Declaration. As a result, while North Korea had not taken specific actions to implement the declaration, in State's view, North Korea's actions under the Agreed Framework represent consistent steps to implement key provisions of the declaration. According to State, North Korea's willingness to freeze and eventually dismantle its graphite-moderated nuclear reactors and related facilities, halted activities that would have threatened the Korean Peninsula and Northeast Asia. Also, according to State, North Korea's agreement to forego reprocessing of its spent nuclear fuel and to replace its nuclear reactors with light-water reactors represents a major step towards ensuring that North Korea will not test, manufacture, produce, receive, store, deploy, or possess nuclear weapons—another key provision of the North-South declaration.<sup>2</sup> Furthermore, according to State, North Korea's agreement to allow a continuous IAEA inspector presence at its nuclear facilities and to eventually come into full compliance with its nuclear safeguards agreement with IAEA, fulfills inspection objectives in the North/South 1992 declaration on denuclearization of the Korean Peninsula.

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## Limited Progress Towards North/South Dialogue

North Korea and South Korea have had a difficult and acrimonious relationship in the four decades since the Korean War.<sup>3</sup> During the postwar period, both Korean governments have repeatedly affirmed their desire to reunify the Korean peninsula, but have not yet met to discuss a permanent and peaceful end to the Korean War. During former President Carter's 1994 visit, the late North Korean leader Kim Il Sung agreed to a first-ever North-South summit. The meeting was planned for July 1994, but was cancelled due to Kim's death that month.

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<sup>2</sup>North Korea's reactors and related nuclear facilities are particularly well suited to produce nuclear materials for bombs.

<sup>3</sup>On July 27, 1953, at Panmunjom, the military commanders of the North Korean People's Army, the Chinese People's Volunteers, and the United Nations Command signed an armistice agreement to cease the hostilities of the Korean War. Neither the United States nor South Korea is a signatory to the armistice, although both adhere to it through the Command. More than four decades later, a comprehensive peace agreement has not replaced the 1953 armistice.

According to the State Department, a key element of the Agreed Framework, which was included at U.S. insistence, is the expectation of improvements in relations between the North and South. The Agreed Framework includes a pledge by North Korea to engage South Korea in dialogue, as a step towards eventual peace and security on the Korean Peninsula. Since the signing of the Agreement, the State Department reports that the United States has taken steps to support South Korean initiatives towards the North and to encourage North Korea to fulfill its commitment to engage in dialogue as soon as possible. Furthermore, the State Department maintains that in its subsequent diplomatic contacts with North Korea, U.S. officials have stressed consistently and frequently the necessity of such contacts. In fact, according to State, improvement in North-South relations is a requirement if U.S./North Korean bilateral relations are to move forward. State refers to fostering improved North-South relations as the most important and the most difficult goal of the Agreed Framework.

The United States supports the peaceful reunification of Korea—divided following World War II—on terms acceptable to the Korean people and recognizes that the future of the Korean Peninsula is primarily a matter for the Korean people to decide. The U.S. position is that a constructive and serious dialogue between the authorities of North Korea and South Korea is necessary to resolve the most important issues on the peninsula, and that concrete steps to promote greater understanding and reduce tension are needed to pave the way for reunification. According to State, the United States is prepared to participate in negotiations between North Korea and South Korea if they desire, provided that both are full and equal participants in any negotiations.

On the basis of these principles, on April 16, 1996, President Clinton and South Korean President Kim Young Sam proposed a “Four Party Meeting” of representatives of South Korea, North Korea, the United States, and the People’s Republic of China as soon as possible and without preconditions. The 4-way talks are intended to result in a permanent peace accord to replace the 1953 military armistice agreement. According to State, the main difference between this proposal and North Korea’s previous position is that North Korea wished to negotiate only with the United States. According to U.S. officials, this is not feasible, as the establishment of a permanent peace is primarily the responsibility of the Korean people. In this respect, both the United States and South Korean Presidents agreed that North Korea and South Korea should take the lead in a renewed search for peace.

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Status of Actions to Promote Peace and  
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More than 1 year after the U.S./South Korean 4-way peace proposal, there are signs of possible movement by North Korea towards engaging South Korea in peace talks. On March 5, 1997, a delegation of U.S. and South Korean officials met in New York City to brief North Korean officials and encourage North Korea's participation in the 4-way peace talks. The State Department reported that the meeting was serious and sincere although no agreements were reached. Two working-level meetings between the United States, South Korea, and North Korea were held in the weeks following the joint briefing. On April 16, the North Korean delegation returned to New York to respond to the U.S. and South Korean proposal for peace talks. At that meeting, North Korea accepted in principle the 4-way talks, but agreement was not reached on the steps needed to initiate the talks.

Although an agreement has not been reached, according to the State Department spokesperson on April 21, 1997, recent events appear to indicate that North Korea is receptive to further talks. However, it is unclear whether North Korea will ultimately agree to participate in the 4-way peace talks. State's spokesperson said that the North Koreans raised the issue of additional U.S. food assistance as a condition of North Korea's participation in the 4-way talks, but that the United States refused to allow food aid to be linked, in any way, to the talks. On April 22, 1997, North Korea proposed that the United States, South Korea, and itself continue to meet before the 4-way talks with China. According to a press account quoting the North Korean Vice Foreign Minister, continued trilateral talks are needed until U.S. negotiators build "confidence" with North Korea.

In addition to preliminary talks on the peace front, the State Department has reported that implementation of the Agreed Framework has created a number of opportunities for other North/South contacts. For example, South Korean officials participated in extensive negotiations between KEDO and North Korea on the agreement for supplying the reactors and related protocols. Also, South Korean personnel have made up most of the site survey teams sent to North Korea to investigate the proposed site for the reactors.

The State Department cited other examples of dialogue between the Koreas, such as a series of North Korean and South Korean meetings in Beijing, whereby South Korea in June 1995 agreed to provide 150,000 tons of rice to North Korea as a grant. Also, in December 1995, North Korea released the crew of a South Korean fishing vessel that had strayed into North Korean waters earlier that year, in response to pleas for the ship's

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return by South Korea. Like the United States, South Korea also has responded repeatedly to worldwide pleas for food assistance to North Korea through the U.N. World Food Program. For example, as of April 28, 1997, South Korea had committed to provide \$6 million in food aid this year to help address North Korea's acute food shortage.

Finally, State reported that the two Koreas have begun to increase their economic ties. Trade between the countries increased from about \$18.8 million in 1989 to about \$195 million in 1994. According to trade figures by the Department of Commerce, South Korea is North Korea's third largest trading partner.<sup>4</sup> South Korea had prohibited substantial direct investment in North Korea. However, after the signing of the Agreed Framework, the South Korean President announced that he would again allow discussions regarding investments. State officials told us that two large South Korean firms—Hyundai and Daiwoo Industries—have already pursued business opportunities with North Korea.

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<sup>4</sup>China is North Korea's largest trading partner, and Japan is its second largest trading partner.

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# U.S. Humanitarian Assistance to North Korea

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This appendix describes recent U.S. efforts to address food and other chronic shortages in North Korea. According to State Department officials, the U.S. assistance is being provided for humanitarian reasons and is in no way linked to the implementation of the Agreed Framework.

In 1995 and 1996, a series of severe floods destroyed a considerable amount of farmland in North Korea. This exacerbated North Korea's chronic food production shortfalls, resulting in widespread food shortages and malnutrition. The United Nations World Food Program—a major international relief organization—estimates this year's shortage at 1.8 million to 2.3 million metric tons—nearly half of North Korea's food needs. Recent reports by numerous sources, including the State Department, indicate that North Korea's food situation is likely to reach a critical stage this spring, with certain groups, especially children, vulnerable to the risk of starvation.

The United States responded to this need by easing restrictions on providing humanitarian assistance to North Korea. In February 1996, the Department of the Treasury modified its Foreign Assets Control Regulations to facilitate private and nongovernmental humanitarian assistance to North Korea under a general license. The amended regulations allow donations of goods and funds for humanitarian assistance to the United Nations, United Nations programs and specialized agencies, and to the American Red Cross and the International Committee of the Red Cross. Furthermore, the amended regulations permit some other donations of goods to meet basic human needs in North Korea, by persons subject to U.S. jurisdiction. In addition to Treasury, the Department of Commerce's Bureau of Export Administration also allows exports of goods to North Korea to meet basic human needs.

Before the general licensing provision became effective, Treasury approved eight licenses for humanitarian assistance to North Korea. The terms of the licenses varied, some dealt with money and others dealt with donations of different types of commodities. As a result, we were unable to determine a total value for these transactions.

In December 1996, Treasury issued a license to a U.S. grain conglomerate—Cargill Corporation—to negotiate with North Korea for the sale and delivery of up to 500,000 metric tons of wheat or rice and to subsequently sell an unspecified quantity of bartered North Korean-origin goods in return for the grain shipment. On April 8, 1997, the State Department confirmed that Cargill had concluded a deal after protracted



negotiations with North Korea. We could not obtain details about this transaction.

According to the Department of Commerce's Bureau of Export Administration, since 1994 Commerce has approved 61 licenses related to North Korea, for either donations or sales of products that meet basic human needs. Commerce has also approved three licenses for United Nations programs supporting humanitarian relief in North Korea. The vast majority of these licenses were for foodstuffs to assist flood victims.

In addition, the United States government has provided \$33.4 million in emergency humanitarian assistance—basically, food and medical supplies—to the World Food Program, which manages and distributes assistance to North Korea. On April 15, 1997, the United States approved 50,000 metric tons of corn. The assistance is valued at about \$15 million and is targeted toward the roughly 2.4 million North Korean children under the age of six who are believed to be at risk. On February 19, 1997, the State Department approved \$10 million in corn, rice, and corn soy blend to North Korea for children under age five and for flood victims. Finally, the United States provided \$8.2 million in assistance in February and June 1996, and in August and October 1995, a total of \$225,000 for medical supplies. According to the State Department, the United States is the single largest donor to the World Food Program over the past 2 years.

# Comments From the Department of State



United States Department of State

*Chief Financial Officer*

*Washington, D.C. 20520-7427*

MAY 20 1997

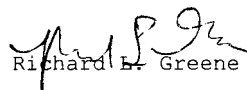
Dear Mr. Fultz:

We appreciate the opportunity to provide Department of State comments on your draft report, "NUCLEAR NONPROLIFERATION: Implementation of the U.S./North Korea Agreed Framework on Nuclear Issues," GAO Job Code 141008.

The Department has reviewed the report and takes issue with some of GAO's conclusions. A discussion of these issues is enclosed. Technical changes were discussed with GAO and were incorporated into the report, as appropriate.

If you have any questions concerning this response, please call Venetia Carotenuto, EAP/K/AF, at (202) 647-1868.

Sincerely,

  
Richard L. Greene

Enclosure:

As stated.

cc:

GAO - Mr. Aloise  
STATE/EAP/K/AF - Ms. Carotenuto

Mr. Keith O. Fultz  
Assistant Comptroller General,  
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**Appendix VII**  
**Comments From the Department of State**

Department of State Comments on GAO Draft Report  
"NUCLEAR NONPROLIFERATION: Implementation of the  
U.S./North Korea Agreed Framework on Nuclear Issues,"  
Job Code 141008

The Department of State has provided detailed comments on the content of the draft report and appendixes, which were incorporated where appropriate. With respect to three issues, we would like to submit the following statement disagreeing with the GAO report:

The Department of State strongly rejects the GAO's implication that the United States will end up bankrolling the projects called for in connection with the settlement of the North Korean nuclear issue in the event of any funding shortfalls. On the contrary, the U.S. has gone to great lengths to arrange for funding from the international community. A substantial portion of the international community has joined -- or will soon join -- the U.S., the Republic of Korea (ROK), and Japan in financing Agreed Framework activities. Any future shortfalls in funding will have to be addressed by all interested states, not by the United States alone. In short, the Department of State believes that the GAO's observation on this point is unbalanced and unfounded.

In addition, we strongly reject the GAO's conclusion that U.S. financing of the initial safe storage of the DPRK's spent nuclear fuel implies that it will also pay for the eventual removal of that fuel from North Korea and disposal elsewhere. U.S. financing of the safe storage of the DPRK's spent nuclear fuel in North Korea was an initial obligation agreed to by the U.S. government at the time that the Agreed Framework was signed. There has been no subsequent discussion or agreement on the details of the removal and disposal of the spent fuel, which will occur some years in the future. We would note that there is strong international interest in participating in the eventual removal and disposal of the spent fuel, particularly in France, the United Kingdom and Canada.

Similarly, the GAO has taken a fundamentally flawed approach to the issue of North Korean responsibility for the upgrade of the power grid in North Korea (Appendix I). The KEDO-DPRK Light-Water Reactor Supply Agreement and its associated documents firmly establish the DPRK's responsibility for a number of projects -- including transmission lines for the grid upgrade -- that are related to, but not part of, the reactor project undertaken by KEDO. The GAO has mistakenly focused on the absence of a DPRK legal obligation to KEDO to upgrade its own power grid. The DPRK does not owe KEDO a duty to upgrade its own grid any more than it owes KEDO a duty to pave the streets of Pyongyang. Nevertheless, responsibility for the grid upgrade clearly rests with the DPRK. There are no grounds for speculating that KEDO or its member governments will undertake these costs.

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