



The Korean Peninsula Energy Development Organization  
600 3<sup>rd</sup> Avenue, 12<sup>th</sup> Floor  
New York, NY 10004

**PROTOCOL BETWEEN THE KOREAN PENINSULA ENERGY  
DEVELOPMENT ORGANIZATION AND THE GOVERNMENT OF THE  
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA ON QUALITY  
ASSURANCE AND WARRANTIES FOR THE IMPLEMENTATION OF A  
LIGHT-WATER REACTOR PROJECT**

The Korean Peninsula Energy Development Organization (hereinafter referred to as "KEDO") and the Government of the Democratic People's Republic of Korea (the Democratic People's Republic of Korea is hereinafter referred to as the "DPRK"),

Reaffirming that KEDO and the DPRK shall faithfully perform their respective obligations under the Agreement on Supply of a Light-Water Reactor Project to the DPRK between KEDO and the Government of the DPRK, signed on December 15, 1995 (hereinafter referred to as the "Agreement"), and protocols to the Agreement,

Recognizing that the transition of responsibilities from KEDO to the DPRK leading to take-over of the LWR units by the DPRK needs to be made smoothly and safely and that detailed steps and responsibilities leading to a smooth and safe Take-over shall be specified in the memorandum of understanding on plant take-over between KEDO and the Government of the DPRK (hereinafter referred to as the "Plant Take-over MOU"),

Desiring to conclude a protocol in accordance with Article VI, paragraph 4 of the Agreement concerning quality assurance and warranties in connection with the light-water reactor (hereinafter referred to as "LWR") plants (hereinafter referred to as the "Protocol"),

Have agreed as follows:

**PART 1**

## **DEFINITIONS**

### **ARTICLE 1**

#### **DEFINITIONS**

1. "Quality Assurance" means all planned and systematic actions necessary to provide adequate confidence that a structure, system or component designed or constructed for the LWR plants will perform satisfactorily and is in accordance with the codes and standards referenced in Article I, paragraph 3 of the Agreement.
2. "Site" means the site specified in the site take over certificate issued by the DPRK to KEDO as well as other working areas which shall enjoy the same status as specified in the Protocol between KEDO and the Government of DPRK on Site Take-over, Site Access and Use of the Site for the Implementation of a LWR Project.
3. "Performance Warranty Test," which shall be the final test of the performance tests referenced in Article III, paragraph 2 of the Agreement, means an operation test performed at the Site in accordance with the applicable American Society of Mechanical Engineers Power Test Code 6.1, Interim Test Code for Alternative Procedure Testing Steam Turbines, and an additional operational test as specified in Article 5, paragraph 1 of the Protocol, to demonstrate the output performance of the LWR units. Such test shall be based upon the performance test program applied to the reactor model selected by KEDO.
4. "Major Component" means the items specified in Annex 1 of the Protocol.
5. "Civil Construction Works" means only the civil works of the buildings and structures specified in Annex 2 of the Protocol.

## **PART 2**

### **QUALITY ASSURANCE**

#### **ARTICLE 2**

##### **PRINCIPLES OF QUALITY ASSURANCE ACTIVITIES**

- 22. KEDO shall be responsible for the establishment and implementation of a Quality Assurance program in accordance with Article VI, paragraph 1 of the Agreement.
- 21. KEDO may assign to its contractors and subcontractors any portion of the work for the establishment and implementation of the Quality Assurance program specified in paragraph 1 of this Article. The portion of the Quality Assurance program KEDO assigns to its contractors and subcontractors is hereinafter referred to as the "Assigned Quality Assurance Program." KEDO shall perform the portion of the Quality Assurance program it does not assign to its contractors and subcontractors. Such portion is hereinafter referred to as the "Nonassigned Quality Assurance Program." The Nonassigned Quality Assurance Program will include but not be limited to conducting audits, and witnessing tests and inspections, as appropriate.
- 20. KEDO shall retain responsibility for the overall effectiveness of the entire Quality Assurance program, which shall consist of the Assigned and Nonassigned Quality Assurance Programs.
- 19. The DPRK shall have the right to participate in the implementation of the Quality Assurance program in accordance with Article VI, paragraph 2 of the Agreement and this Protocol.
- 18. KEDO and the DPRK shall cooperate to ensure that the Nonassigned Quality Assurance Program is implemented in a smooth and expeditious manner without unnecessary disruption.
- 17. The DPRK shall establish and implement its own Quality Assurance program for safe operation and maintenance. KEDO and the DPRK shall have consultations to ensure that the DPRK's Quality Assurance program is in accordance with international standards prior to its implementation.

### **ARTICLE 3**

#### **ESTABLISHMENT AND IMPLEMENTATION OF A QUALITY ASSURANCE PROGRAM**

- 16. KEDO and the DPRK shall develop and implement their respective Quality Assurance programs for the commissioning period to fully support the responsibilities that they undertake under the Plant Take-over MOU. The detailed responsibilities to be agreed in the Plant Take-over MOU shall be based on a general division of responsibilities in which the DPRK is responsible for operation of each unit from the start of fuel load for that unit

and KEDO is responsible for completing the LWR Units, including the performance of commissioning tests. The aforementioned division of responsibilities shall in no way relieve the DPRK of its nuclear liability obligations specified in the Agreement.

- 15. To facilitate the development of the DPRK's Quality Assurance program, KEDO will provide technical assistance that will include the provision of guidelines and consultation for the preparation of the DPRK's Quality Assurance program.
- 14. A reasonable number of persons from the DPRK shall have the right to participate in the implementation of the Nonassigned Quality Assurance Program at the Site. KEDO and the DPRK shall cooperate to ensure that these persons have access to facilities and documents related to the Nonassigned Quality Assurance Program within the Site, subject to agreement with KEDO.
- 13. A reasonable number of persons from the DPRK may also participate in the implementation of the Nonassigned Quality Assurance Program at locations outside the DPRK at the invitation of KEDO. When DPRK personnel participate in the Nonassigned Quality Assurance Program at locations outside the DPRK, KEDO shall take appropriate measures available to it to ensure the smooth entry and exit, and the safety of such personnel and protection of their property.
- 12. When DPRK personnel participate in the Nonassigned Quality Assurance Program conducted by KEDO, DPRK personnel shall review the same Quality Assurance documents, visit the same Quality Assurance-related facilities, and observe the same Quality Assurance-related tests and inspections as KEDO personnel who implement the Nonassigned Quality Assurance Program. When participating in the Nonassigned Quality Assurance Program, DPRK personnel shall comply with the regulations, including national export control laws, applicable to KEDO, its contractors and subcontractors. DPRK personnel may be allowed to retain relevant documents, including copies of documents, related to the Nonassigned Quality Assurance Program, and may be allowed to take photographs or videos of such facilities, tests, or inspections with the prior permission of KEDO.
- 11. KEDO shall notify the DPRK Quality Assurance division sufficiently in advance of the implementation of the Nonassigned Quality Assurance Program and provide the DPRK with the scope, schedule and other relevant information of the Quality Assurance activity concerned. The DPRK shall notify KEDO of the names, titles, responsibilities, experience and other

relevant information of DPRK persons who will participate in the Nonassigned Quality Assurance Program. The DPRK shall ensure and demonstrate, by providing certification or other documentary evidence, that such persons have full working knowledge of the codes and standards referenced in Article I, paragraph 3 of the Agreement.

- 10. After the notification specified in paragraph 6 of this Article, KEDO may proceed with the implementation of the Nonassigned Quality Assurance Program as scheduled. The validity of the Nonassigned Quality Assurance Program shall not be affected if persons from the DPRK are not present.
- 9. DPRK personnel who participate in the Nonassigned Quality Assurance Program shall notify only KEDO of any suggestions they may have as a result of their participation as referenced in paragraphs 3, 4, 5 and 6 of this Article. KEDO shall give such suggestions due consideration when providing its findings and recommendations to its contractors and subcontractors. Any discrepancy arising therefrom will be consulted upon by KEDO and the DPRK. However, KEDO shall make the final determination of the content of such findings and recommendation.
- 8. In accordance with Article VI, paragraph 2 of the Agreement, KEDO shall provide the DPRK with the opportunity to review the results of the implementation of the Nonassigned Quality Assurance Program.
- 7. The DPRK shall cooperate to ensure that KEDO, its contractors and subcontractors have access to the locations of potential suppliers, if any, in the DPRK for the purpose of implementing the Quality Assurance program in accordance with the relevant protocols and agreements between KEDO and the DPRK.
- 6. The DPRK and KEDO shall respectively bear the expenses incurred by their respective participation in the Nonassigned Quality Assurance Program.
- 5. Except in the case of willful misconduct or gross negligence by KEDO, its contractors and subcontractors, (a) KEDO, its contractors and subcontractors who participate in the implementation of the Nonassigned Quality Assurance Program shall not be liable for damages to any DPRK personnel or property of any DPRK personnel during the DPRK's participation in such Nonassigned Quality Assurance Program, including travel to and from locations for such participation, and (b) the DPRK shall indemnify and hold harmless KEDO, its contractors and subcontractors from and against all claims, damages, losses and expenses arising out of or resulting from the DPRK's participation in the Nonassigned Quality Assurance Program.

## **ARTICLE 4**

### **QUALITY ASSURANCE DOCUMENTS**

1. KEDO shall supply to the DPRK one copy of its Quality Assurance manual, which shall describe the overall Quality Assurance program, and one copy of its prime contractor's Quality Assurance manual for the LWR project. The manuals specified in this paragraph shall be supplied to the DPRK no later than when KEDO provides its preliminary safety analysis report to the DPRK.
2. In the event that the Quality Assurance manuals specified in paragraph 1 above are modified or revised, KEDO shall provide the DPRK with such modification or revision in a timely manner.
3. Prior to the DPRK's participation in the Nonassigned Quality Assurance Program, KEDO shall make available to the DPRK Quality Assurance documents required for such participation, as deemed appropriate by KEDO in accordance with international practice.
4. KEDO shall make available to the DPRK during the LWR project the Quality Assurance documents and other necessary information as needed for the DPRK's safe operation and maintenance of the LWR plants, as deemed appropriate by KEDO in accordance with international practice.
5. KEDO shall transfer to the DPRK plant-specific Quality Assurance records at the time each plant's take-over certificate is issued and Quality Assurance records common to both plants at the time the plant take-over certificate is issued for the second LWR plant, in accordance with the American Society of Mechanical Engineers NQA-1 and U.S. Nuclear Regulatory Commission Regulatory Guide 1.28 as implemented in the international nuclear industry for the safe operation and maintenance of the plants. KEDO shall also transfer to the DPRK within six months after the plant take-over certificate is issued those Quality Assurance records that were not completed and not ready to be transferred to the DPRK at the time the plant take-over certificate was issued. In addition, KEDO shall transfer to the DPRK the available Quality Assurance records as a part of turn-over package to be specified in the Plant Take-over MOU at the time of the Turn-over of each plant.

## **PART 3**

### **WARRANTIES**

## ARTICLE 5

### WARRANTY FOR GENERATING CAPACITY

1. KEDO guarantees that each LWR plant will be capable of achieving a gross electrical output, measured at the generator terminal, of 1,000 MW (e) with a three percent allowance. Such gross electrical output is guaranteed with the unit operating at 100 percent reactor power, 0.2 percent steam generator blowdown flow, and a sea water temperature of 23.5 degrees centigrade. A Performance Warranty Test shall be used to demonstrate the gross electrical output. Following the American Society of Mechanical Engineers 6.1 performance test, an additional operational test shall be conducted at a warranted power level for a period of 120 hours. If such additional test is interrupted or the power level is reduced for any reason, the test duration time will resume or restart, as deemed appropriate by KEDO upon consultation with the DPRK, where it was stopped once the power level is restored.
2. The DPRK shall provide off-site power required for start-up testing within six months after the start of reactor vessel installation. The DPRK shall also provide an off-site electrical grid and power source within three months after the start of the cold hydrostatic test in order that the Performance Warranty Test can begin and be completed in accordance with an Initial Test Plan (hereinafter referred to as the "Plan"). KEDO shall provide the Plan, which shall include a scheduled start date and scheduled completion date for the Performance Warranty Test, to the DPRK twelve months prior to scheduled initial fuel load. The timing of the start of reactor vessel installation, the start of the cold hydrostatic test and the scheduled initial fuel load shall be specified in the protocol on delivery schedule to be agreed between KEDO and the DPRK in accordance with Article III, paragraph 3 of the Agreement.
3. Upon KEDO's request, the DPRK shall demonstrate that it is taking appropriate steps to provide the off-site power required for start-up testing and the off-site electrical grid. The off-site power required for start-up testing and the off-site electrical grid shall be able to meet interface requirements provided by KEDO and consulted upon with the DPRK, based on the codes and standards referenced in Article I, paragraph 3 of the Agreement.
4. In the event that an LWR plant does not achieve the gross electrical output specified in paragraph 1 of this Article, unless by failure of the DPRK to provide the necessary grid and stable electricity and/or any other circumstances beyond the control of KEDO, KEDO shall make reasonable efforts to improve the plant's capability to achieve such gross electrical output. If, after such efforts, KEDO concludes that an LWR plant is unable to

achieve such gross electrical output, KEDO shall declare the Performance Warranty Test complete and the amount of deduction per 1 kW(e) deficiency below 970 MW(e) and the total amount of the deduction (from the amount to be repaid by the DPRK for the LWR project) shall be determined upon consultation between both parties.

5. In the event the DPRK has not provided an electrical grid specified in paragraph 2 of this Article, KEDO shall not deliver fuel to the Site and shall notify the DPRK in writing that it will not deliver fuel to the Site.
6. If for any reason the Performance Warranty Test for an LWR plant is not completed as scheduled, the DPRK shall not test or operate that LWR plant until such time as is agreed between KEDO and the DPRK.

## **ARTICLE 6**

### **WARRANTY FOR MAJOR COMPONENTS**

In accordance with Article VI, paragraph 3 of the Agreement, KEDO guarantees that each Major Component provided by its contractors and subcontractors will be new at the time of installation and free from defects in design, workmanship, and material for a period of two years after completion of the Performance Warranty Test for each LWR plant, but in no event longer than five years after the date of delivery of such Major Component to the Site. Should a Major Component prove defective during the warranty period, KEDO shall repair the defect or replace the defective components within a period of time to be agreed between KEDO and the DPRK through the consultations specified in Article 10 of the Protocol.

## **ARTICLE 7**

### **WARRANTY FOR FUEL FOR INITIAL LOADING**

1. In accordance with Article VI, paragraph 3 of the Agreement, KEDO guarantees that each fuel assembly for initial loading of each LWR plant shall be free from defects in material and workmanship. The warranty under this paragraph for the first LWR plant shall expire upon initial loading of the fuel assemblies to the first LWR plant or one year after the delivery of such fuel assemblies to the Site, whichever comes first. The warranty under this paragraph with respect to the second LWR plant shall expire upon initial loading of the fuel assemblies to the second LWR plant or one year after the delivery of such fuel assemblies to the Site, whichever comes first. Should a



fuel assembly for either LWR plant prove defective in material or workmanship within the relevant warranty period, KEDO shall repair or replace it within a period of time to be agreed between KEDO and the DPRK through the consultations specified in Article 10 of the Protocol.

2. In accordance with Article VI, paragraph 3 of the Agreement, KEDO guarantees the mechanical integrity of each fuel assembly for initial loading. If the fuel assemblies for initial loading for each LWR plant are delivered to the Site but are not loaded for a period longer than one year, then the warranty for the mechanical integrity of the fuel assemblies for initial loading for each LWR plant as specified in this paragraph shall be null and void. The warranty for mechanical integrity for fuel assemblies for initial loading under this paragraph for the first LWR plant shall expire five years after the fuel assemblies are loaded into the first reactor, or six years after delivery of such fuel assemblies to the Site, whichever comes first. The warranty under this paragraph for the second LWR plant shall expire five years after the fuel assemblies are loaded into the second reactor, or six years after delivery of such fuel assemblies to the Site, whichever comes first. In the event that a fuel assembly is removed from the core without achieving its design discharge burnup due to a defect in mechanical integrity during the warranty period, KEDO shall repair or replace such fuel assembly, as it determines upon consultation with the DPRK, within a period of time to be agreed between KEDO and the DPRK through the consultations specified in Article 10 of the Protocol. The design discharge burnup for such warranty shall be based on the reference model selected by KEDO and shall be provided by KEDO upon completion of the reactor core design.
3. In accordance with Article VI, paragraph 3 of the Agreement, KEDO guarantees the cycle burnup for the initial core (hereinafter referred to as "Warranted Cycle Burnup" or "WCB"), which is the average burnup value for all the fuel assemblies in the initial core during the first cycle. The WCB shall be provided by KEDO to the DPRK after completion of the reactor core design. Should the fuel supplied for the initial core fail to achieve the WCB for the first cycle less than a three (3) percent allowance, KEDO shall make a deduction from the amount to be repaid by the DPRK for the LWR project. The amount of this deduction per megawatt day/metric ton of uranium (MWD/MTU) deficiency below 97 percent of the WCB shall be determined upon consultation between both parties.
4. KEDO shall assist the DPRK to obtain LWR fuel, other than that provided pursuant to Annex 1 to the Agreement, through commercial contracts with a DPRK-preferred supplier for the useful life of the plants. Prior to plant take-over, KEDO shall use its good offices to assist the DPRK in its efforts to obtain such a contract and to assist in ensuring that the fuel assemblies will

be supplied at fair and reasonable prices, in accordance with a schedule to be determined by the contracting parties so as not to hinder the continued operation of the LWR plants. In the event that fuel assemblies not supplied by KEDO are loaded in the core with the fuel for initial loading supplied by KEDO, KEDO's warranties with respect to the fuel for initial loading shall be null and void.

5. The DPRK shall perform the work with respect to the detection and identification, subject to review by and agreement with KEDO, decontamination, removal and movement within the Site of failed fuel assemblies provided by KEDO under the warranty in this Article, as well as for work with respect to the insertion of repaired fuel assemblies into the reactor.
6. In the event KEDO repairs fuel assemblies under its warranty, the DPRK shall make such fuel assemblies available for repair by KEDO in the spent fuel storage pool and shall permit KEDO and its personnel, including the personnel of KEDO's contractors and subcontractors, to use the LWR plant facilities and equipment at no cost.

## **ARTICLE 8**

### **WARRANTY FOR CIVIL CONSTRUCTION WORKS**

In accordance with Article VI, paragraph 3 of the Agreement, KEDO guarantees that Civil Construction Works will be free from defects in design, workmanship and material for a period of two years from the scheduled completion of the Performance Warranty Test for each LWR plant. If the Performance Warranty Test is completed after its scheduled completion date through no fault of KEDO, the warranties specified in this Article shall last for a period of two years from the scheduled completion of the Performance Warranty Test for each LWR plant. If a defect in design, workmanship or material appears during the warranty period, KEDO shall repair it within a period of time to be agreed between KEDO and the DPRK through the consultations specified in Article 10 of the Protocol.

## **ARTICLE 9**

### **GENERAL TERMS OF WARRANTIES**

1. KEDO provides no warranties or deductions related to warranties, express or implied, other than those contained in the Protocol

2. The DPRK shall operate and maintain the LWR plants and related facilities in a normal and proper manner and in accordance with the technical specifications in the final safety analysis report, and the operating and maintenance guidelines provided by KEDO, its contractors and subcontractors; use the LWR plants and related facilities for their original purpose without alteration or misuse; reach a written agreement with KEDO prior to making any modifications of any part of either LWR plant; and engage in all actions required for safe operation of the LWR plants and related facilities, including plant-operator training and providing necessary assistance to enable safety reviews as specified in Article X, paragraph 5 of the Agreement. If the DPRK fails to meet the requirements in this paragraph, KEDO shall be exempted from the warranties specified in the Protocol. KEDO shall further be exempted from its warranties as provided in the Protocol with respect to normal wear and tear of the LWR plants. In no event shall KEDO, its contractors and subcontractors be liable for any indirect or consequential losses or damages arising out of the warranty coverage as provided in the Protocol.
3. The DPRK shall immediately notify KEDO in the event that it believes any action under the warranties specified in this Protocol is necessary. KEDO, its contractors and subcontractors shall have the right of access to all parts of the LWR plants and related facilities and to records of the working and performance of the LWR plants and related facilities.
4. In the event KEDO performs work under the warranties specified in the Protocol, the DPRK shall make available to KEDO DPRK workers who are responsible for the safe operation and maintenance of the LWR plants, and appropriate working conditions for such work at the Site, including facilities and tools supplied by KEDO, its contractors or subcontractors for the LWR project.
5. In the event KEDO requires access to a contaminated area under the warranties specified in the Protocol, the DPRK shall take necessary measures available to decontaminate the damaged area, including any equipment within such area.
6. When performing work in the DPRK under the warranties specified in the Protocol, KEDO, its contractors and subcontractors and their respective personnel shall enjoy the same legal status, privileges, immunities and other rights and have the same obligations specified in the Agreement and its applicable protocols. In such cases, the DPRK shall provide services similar to those provided during the LWR project at a fair price agreed between KEDO and the DPRK similar to the price charged during the LWR project.

7. Any deductions from the amount to be repaid by the DPRK for the LWR project under the warranties specified in the Protocol shall be applied on a pro-rata basis against each and all of the remaining payments to be made by the DPRK under the protocol on terms of repayment for the LWR Project to be agreed between KEDO and the DPRK.
8. KEDO shall assist the DPRK to obtain spare and wear parts, consumables, special tools, and technical services for the operation and maintenance of the LWR plants, other than those provided pursuant to Annex 1 to the Agreement, through commercial contracts with a DPRK-preferred supplier for the useful life of the LWR plants. Prior to a plant take-over, KEDO shall use its good offices to assist the DPRK in its efforts to obtain a long-term maintenance agreement for items referred to in this paragraph at fair and reasonable prices.

## **PART 4**

### **ARRANGEMENTS FOR THE IMPLEMENTATION OF THE PROTOCOL AND GENERAL PROVISIONS**

#### **ARTICLE 10**

##### **ARRANGEMENTS FOR THE IMPLEMENTATION OF THE PROTOCOL**

KEDO and the DPRK shall have consultations to ensure the expeditious and smooth implementation of the Protocol. Such consultations, which shall include technical experts from KEDO and the DPRK as needed, shall occur upon the request of either side at the Site or at any other mutually agreed place.

#### **ARTICLE 11**

##### **GENERAL PROVISIONS**

1. The Protocol shall enter into force on the date of its signature.
2. Nothing in this Protocol shall affect or limit the obligations of KEDO or of the DPRK under Article XI of the Agreement.
3. The Annexes of the Protocol shall be an integral part of the Protocol.
4. The Protocol may be amended by written agreement between the two parties. Any amendment shall enter into force on the date of its signature.

5. Article XV of the Agreement shall apply to any disputes arising under the Protocol.

IN WITNESS WHEREOF, the undersigned, being duly authorized, have signed the Protocol.

Done at \_\_\_\_\_ on the \_\_\_\_ of \_\_\_\_\_, 2001, in duplicate in the English language.

## **ANNEX 1**

The Major Components referenced in Article 1, paragraph 4 of the Protocol consist of the following for each LWR plant:

1. Reactor pressure vessel
2. Control element drive mechanisms
3. Steam generators
4. Pressurizer
5. Reactor coolant pumps
6. Turbine generator
7. Feed water heaters
8. Condenser
9. Condensate pumps
10. Feed water pumps
11. Generator circuit breaker
12. Main transformers
13. Class 1 E diesel generator
14. Refueling machine
15. Polar crane
16. Circulating Water Pumps

## **ANNEX 2**

The Civil Construction Works referenced in Article 1, paragraph 5 of the Protocol consist of the following for each LWR plant:

1. Containment building
2. Fuel building
3. Primary and secondary auxiliary buildings
4. Turbine building
5. Radwaste building
6. Access control building
7. Component cooling water heat exchange building
8. Circulating water intake structure
9. Essential service water intake structure
10. Intake/discharge conduit
11. Discharge outlet structure
12. Water treatment building

### **ANNEX 3**

As referenced in Article 7, paragraph 3 of the Protocol, the first cycle will be deemed to have reached its end-of-cycle when the core excess reactivity for that cycle is reduced to zero under the following plant and core conditions:

1. The reactor is operating at rated thermal output under design conditions with equilibrium xenon and samarium poisoning corresponding to the rated core thermal output;
2. The boron concentration is 10 parts per million or less; and,
3. All full-length control rods are fully withdrawn.