

# **Instructions to Bidders**

(No.: ITB23-KCN-03)

## **SHIN-HANUL NUCLEAR UNITS 3&4 FOR CONSULTING SERVICES FOR ARCHITECT ENGINEERING**

**2023. 07.**



**KEPCO ENGINEERING & CONSTRUCTION COMPANY, INC.**

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# **CHAPTER I**

## **GENERAL INFORMATION**

- 1. OBJECTIVES**
- 2. PROJECT DESCRIPTION**
- 3. DEFINITION OF TERMS**
- 4. DESIGN APPROACH**
- 5. CONTRACT PARTIES, RIGHTS, AND RESPONSIBILITIES**

## 1. Objectives

The objective of this consulting service is to provide KEPCO E&C with engineering, technology, and management consulting service during the conceptual/basic design, and detail design phase of Shin-Hanul Nuclear Units 3&4 ("SHN 3&4" hereinafter) project.

## 2. Project Description

Korea Hydro & Nuclear Power Co. Ltd. ("KHNP") launched the project to construct SHN 3&4 and KEPCO E&C has been designated as the Architect Engineering (A/E) of the Project. In implementation of the A/E services, KEPCO E&C will get technical support, or, in a generalized term, "consulting services" from foreign engineering firms.

KHNP is responsible for the overall project management, procurement, construction management, and start-up. KEPCO E&C is responsible for the A/E services which include the engineering design of the plant except for the Nuclear Steam Supply System (NSSS) and Turbine Generator (T/G). The scope of NSSS and T/G design will be defined by separate contracts. The NSSS and T/G are supplied by the same supplier (DOOSAN) as that for Shin-Kori Units 5&6 ("SKN 5&6" hereinafter).

SHN 3&4 will be rated at approximately 1,400 MWe each and constructed at Shin-Hanul site. The first unit (SHN 3) is scheduled to be completed in October 31, 2032 and the second unit (SHN 4) is one year later. The major project milestones for SHN 3 are as follows:

### Project Milestones

· Issue Preliminary Safety Analysis Report	April 04, 2016
· Excavation	April 01, 2024
· First Concrete Pour	December 01, 2025
· Set Reactor Vessel	April 01, 2028
· Fuel Load	February 01, 2031
· Unit 3 Completion	October 31, 2032
· Unit 4 Completion	October 31, 2033

Table I-1 shows major site conditions and Figure I-1 shows the location of the site.

Table I -1 Major Site Conditions of Shin-Hanul 3&4

A.	Sea water levels (Referred to Incheon Land Datum)	
	o H.H.W.L.	+ 0.588 m
	o Approx. H.W.L.	+ 0.018 m
	o Average sea level (M.S.L.)	+ 0.157 m
	o Approx. L.W.L.	- 0.332 m
	o L.L.W.L.	- 0.692 m
B.	Site elevation	
	o Nominal plant grade elevation	+ 10.00 m
C.	Precipitations	
	o Average yearly precipitation	556.3 mm
	o Maximum 24-hour precipitation	870.5 mm
	o Maximum hourly precipitation	100.5 mm
D.	Design snow load	1,200Pa
E.	Ambient Air temperatures	
	o Maximum(100-year return period)	39.7 °C
	o Minimum(100-year return period)	- 20.7 °C
	o Average	13.9 °C
F.	Wind speed	
	o Design maximum wind speed (10-minute mean)	36.0 m/sec
	o Mean annual wind speed (10-minute mean)	2.7 m/sec
G.	Sea water temperatures	
	o Maximum monthly average	28.0 °C
	o Minimum monthly average	2.4 °C
H.	Seismic accelerations	
	o Safe Shutdown Earthquake (SSE)	
	- Horizontal	0.3 g
	- Vertical	0.3 g
	o Operation Base Earthquake (OBE)	
	- Horizontal	0.1 g
	- Vertical	0.1 g

Figure I -1 Location of Site





### 3. Definition of Terms

The following definitions are applicable to this Invitation To Bid.

- 1) Acceptance means  
KEPCO E&C's written acceptance (as stipulated in Article 25, "Acceptance of Services" of Section 1 in Chapter III) of the completion of the contractual services performed by the Consultant.
- 2) Actual Base Salary means  
The actual hourly salary or wage rate paid to the Consultant's billable personnel for the Services including Visiting Engineers.
- 3) Agreement means  
Related documents and appendices to be entered into between KEPCO E&C and the Consultant concerning the performance of the specified Services.
- 4) Best Efforts means  
The efforts which reflect the degree of care and skill customarily exercised by an engineer, performing services, under similar circumstances.
- 5) Business Effects means  
The equipment, materials, manuals, instruments, computer programs and calculators of the Consultant or Consultant's personnel required for the performance of the Onshore Services. To be considered as Business Effects, as used herein, they shall be packed and shipped to Korea separately from any personal effects or Consultant's Seoul office supplies.
- 6) Scheduled Completion Date (SCD) means  
The respective SCD of SHN 3&4.
- 7) Consultant means  
The first is: The firm which will provide consulting services to KEPCO E&C in accordance with this Agreement, while the second is: the Consultant's personnel who will provide consulting services for specified areas concerning KEPCO E&C. For exact definition of the second meaning of Consultant, Appendix C, "Preliminary Project Organization, Organization Groups and Positions" shall be referred. The correct meaning should be

found from the context of the passage.

- 8) Day or days means  
Any complete calendar day unless otherwise expressly indicated as a working day.
- 9) General Engineer (GE) means  
The Consultant whose work assignments involve more in generalized engineering tasks. For detail work assignments, refer to Appendix D.
- 10) KHNP means  
Korea Hydro & Nuclear Power Company, Ltd., the Owner of the Project, and its legal representatives, successors, and assignees.
- 11) KEPCO E&C means  
KEPCO Engineering & Construction Company, Inc. and its legal representatives, successors, and assignees.
- 12) Offshore Services means  
The work to be performed outside the Republic of Korea.
- 13) Onshore Services means  
The work to be performed in the Republic of Korea.
- 14) OTS means  
Offshore Technical Support Services.
- 15) Owner means  
Korea Hydro & Nuclear Power Company, the Owner of SHN 3&4.
- 16) Party or Parties means  
Contracting party or contracting parties as the case may be.
- 17) Personal Effects means  
Items, goods and effects which are the personal property of the Consultant's personnel and their families or items which are used for establishing a household.

18) Project means

(1) When referred to KHNP, it shall mean the main course of the construction of SHN 3&4 encompassing the design, manufacturing, field construction, start-up, and all the related support activities; and

(2) When referred to KEPCO E&C, it shall mean the supply of all the project services by KEPCO E&C as part of the Project referred to KHNP.

19) Professional Responsibility means

The responsibility as defined in Article 11.2 through 11.7 of Section 1 in Chapter III.

20) PWR means

Pressurized Water Reactor.

21) Services means

The Consulting services, as a whole or in part, that will be provided by the Consultant under the Agreement including both Onshore and Offshore services.

22) Specialist (SP) means

The Consultant whose work assignments involve more specialized engineering tasks. Appendix D, indicates the detail work assignments.

23) Unit means

A complete steam-electric power generation system consisting of one Nuclear Steam Supply System (NSSS) and one Turbine Generator (T/G), with their corresponding accessories.

24) SHN 1&2 means

Shin-Hanul Nuclear Units 1&2 which is under construction located in Uljinbuk-ro, Buk-myeon, Uljin-gun, Gyeongsangbuk-do, Korea.

25) SKN 5&6 means

Shin-Kori Nuclear Units 5&6 which will be located in Haemaji-ro, Seosaeng-myeon, Ulju-gun, Ulsan Metropolitan City, Korea. Also, SKN 5&6 is the reference power plant of SHN 3&4.

26) SHN 3&4 means

Shin-Hanul Nuclear Units 3&4 which will be located in Uljinbuk-ro, Bukmyeon, Uljin-gun, Gyeongsangbuk-do, Korea.

27) Visiting Engineer means

Consultant's personnel assigned to Onshore Services for certain tasks for periods of less than sixty (60) days counted from the first actual working day to the last actual working day at the request of KEPCO E&C.

#### 4. Design Approach

SHN 3&4 is Advanced Pressurized Reactors with a 1,400 MWe capacity (APR1400). SHN 3&4 has been enhanced safety and economics, and introduced advanced construction technologies such as RVI-RCL parallel installation, automatic welding, pilot complex module, non-shoring method through composite structural system, prefabrication/preassembly of containment liner plate, in-containment refueling water storage tank and auxiliary feedwater storage tank.

The General Arrangement of the SHN 3&4 is focused on enhancing plant safety, improving economic competitiveness, and convenience of the plant operation. The SHN 3&4 consists of a Nuclear Island, Turbine Island, and Site Specifics.

The NSSS and T/G will be supplied by the same supplier as that for the SKN 5&6. SHN 3&4 design should be modified based upon the New Design features (Refer to Appendix A) and the Licensing Requirements applied to NSSS and T/G.

The following requirements should be duly incorporated in the development of the SHN 3&4 design:

- Adaptation to the Shin-Hanul site: Major site parameters are given in Table I-1.

- New Design features for SHN 3&4: The major items are summarized in Appendix A.
- The licensing requirements: The applicable federal regulations and regulatory guides of the U.S.A. shall be in effect as of December 31, 2021.
- Code and standard requirements: KEPIC (Korea Electric Power Industry Code) shall be the 2005 Edition through 2021 Addenda. All other codes and standards except KEPIC shall be the edition in effect as of December 31, 2021, unless indicated otherwise.
- Changes in NSSS, T/G, and Balance of Plant (BOP) equipment suppliers' requirements.

## 5. Contract Parties, Rights, and Responsibilities

KEPCO E&C is the prime contractor to KHNP for the Services described in the scope of services for the Project. KEPCO E&C will execute a Consulting Services Agreement with a foreign firm to secure the required consulting services as described in this Invitation To Bid.

All contractual rights and responsibilities between KEPCO E&C and the Consultant will be solely defined by the Agreement. Thus, in general, there will be no direct contractual relationships between KHNP and the Consultant unless otherwise specified in the Agreement document.

# **CHAPTER II**

## **INSTRUCTIONS TO BIDDER**

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- 6. LANGUAGE OF BID**
- 7. CONFIDENTIAL NATURE OF DOCUMENTS**
- 8. OWNERSHIP OF BID AND COMPENSATION**
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# 1. General Instructions

## 1.1 General

The Bidder is required to prepare and submit its Bid fully reflecting the contents of the Invitation To Bid (ITB), especially Section 1 in Chapter III – **General Terms and Conditions** in the ITB which will be the basic terms and conditions to be finalized through contract negotiation. Unless the Bidder clearly states its exceptions to the terms and condition required in the ITB, the Bid shall be construed as offered in compliance with the terms and conditions as described in the ITB.

The documents of the ITB shall consist of the following:

Chapter I     General Information  
Chapter II    Instructions to Bidder  
Chapter III   Commercial Information  
Chapter IV    Technical Information  
Appendices

## 2. Submission of Bid

2.1 The Bidder shall submit Bid Document to the following address by e-mail first in accordance with the Paragraph 3 “Deadline for Submission and Validity of Bid”:

Attn. 1 : Mr. Joonchul Lee  
General Manager  
Business Contract Team  
KEPCO Engineering & Construction Company, Inc.  
269 Hyeoksin-ro, Gimcheon-si, Gyeongsangbuk-do Republic of Korea  
Tel    : +82-54-421-3015  
Fax    : +82-54-421-3301  
E-mail : Jclee776@kepc-enc.com

Attn. 2 : Mr. Seunghyun Lee  
Business Contract Team  
KEPCO Engineering & Construction Company, Inc.  
269 Hyeoksin-ro, Gimcheon-si, Gyeongsangbuk-do Republic of Korea  
Tel    : +82-54-421-3053  
Fax    : +82-54-421-3301  
E-mail : sh.lee@kepc-enc.com

## 2.2 Clarification of Bid

Should the Bidder find discrepancies or should any doubt or question exist as to the true meaning or intent of any portion of the contents of this ITB, the Bidder may submit questionnaires by e-mail to KEPCO E&C for clarification before one week of submission of its Bid. To assist in the examination and evaluation of the Bid, KEPCO E&C may, at its discretion, ask the Bidder for a clarification of its Bid. The request for clarification and the response shall be given in writing.

2.2.1 Bidder's questionnaires for technical matters must be submitted to the following address:

Attn : Mr. YoonHo Nam  
Project Manager  
SHN 3&4 Project  
KEPCO Engineering & Construction Company, Inc.  
269 Hyeoksin-ro, Gimcheon-si, Gyeongsangbuk-do  
Republic of Korea  
Tel : +82-54-421-6112  
Fax : +82-54-421-3246  
E-mail : yhnam@kepco-enc.com

2.2.2 Bidder's questionnaires for commercial matters must be submitted to the following address:

Attn : Mr. Seunghyun Lee  
Subcontract Team/ Contract Department  
KEPCO Engineering & Construction Company, Inc.  
269 Hyeoksin-ro, Gimcheon-si, Gyeongsangbuk-do  
Republic of Korea  
Tel : +82-54-421-3053  
Fax : +82-54-421-3301  
E-mail : sh.lee@kepco-enc.com

## 2.3 Format of Bid

The Bidder shall propose its Bid in the following separate parts:

Part I Commercial Bid  
Part II Technical Bid



Technical Proposal and Commercial Proposal shall be submitted in separated files and named accordingly. Two separated files using Zip files for each can be an option.

## 2.4 Signing of Bid

The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by the person duly authorized to bind the Bidder to the Contract. A written power-of-attorney shall accompany the Bid indicating that the person who signed the Bid is authorized to bind the Bidder. The Bidder's corporate entity submitting the Bid shall be the entity entering into the Contract.

## 2.5 Acceptance of Bid

There is no commitment on the part of KEPCO E&C to accept the Bid or its conditions proposed by the Bidder. The acceptance of the Bid shall be at the sole discretion of KEPCO E&C.

## 3. Deadline for Submission and Validity of Bid

Bidder(s) submit its Bid Documents no later than **09:00 a.m. Korean Standard Time on August 26, 2023** and the Bid Documents shall remain firm valid for a period of **six (6) months** from the date of this deadline. Once submitted, proposals shall not be withdrawn until the validity of the Bid Documents. The request and response thereto shall be made in writing by e-mail (attached PDF, including signature).

## 4. Late Bid

Any Bid received by KEPCO E&C after the deadline for submission of Bid pursuant to Paragraph 3 above may be rejected.

## 5. Bid Currencies

The Bidder shall submit its Bid price and unit rates in U.S. dollars (US\$) except for

the living allowance in Korea which should be proposed in Korean Won.

## 6. Language of Bid

The Bid prepared by the Bidder and all correspondences and documents relating to the Bid exchanged between the Bidder and KEPCO E&C shall be written in English.

## 7. Confidential Nature of Documents

KEPCO E&C will respect the Bidder's confidential classification, if any, assigned to data as identified by the Bidder.

However, KEPCO E&C may disclose the contents of the Bid to the Korean government authorities or third parties as necessary for review and evaluation of the Bid.

## 8. Ownership of Bid and Compensation

The Bid once submitted to KEPCO E&C shall not be returned to the Bidder regardless of whether it is accepted or rejected. The Bidder shall bear all costs associated with the preparation and submission of its Bid, and in no case will KEPCO E&C be responsible or liable for those costs, regardless of the conduct or outcome of the Bid process.

## 9. Modification, Rejection and Withdrawal of Bid

KEPCO E&C reserves the right, without any liability to the Bidder: a) to reject any part of, or all Bids; b) to modify or withdraw this ITB at any time or; c) to request re-bidding when re-bidding is necessary for the best interests of KEPCO E&C; and d) to enlarge or reduce the scope of work to be included in the ITB.

No Bid shall be withdrawn in the interval between the submission of Bid and the expiration of the period of the Bid validity.

No claims for compensation with regard to the rejection, modification, withdrawal or rebidding shall be allowed.

## 10. Bid Evaluation

## 10.1 Basis

Evaluation of the Bid will be made based upon the criteria made by KEPCO E&C. KEPCO E&C reserves the right to request a clarification on any aspect of the Bid submitted. Any procedure, method and decision to be taken by KEPCO E&C with regard to the evaluation of the Bid shall be decisive and no claim by the Bidder will be accepted.

## 10.2 Criteria for Selection of Consultant

### 10.2.1 Commercial Bid (30%)

Commercial evaluation shall be made based on 80% bid price and 20% GTC

- 1) Bid amount made in accordance with price Bid format in Chapter III of this ITB
- 2) Exceptions and deviations to General Terms and Conditions (GTC) in Chapter III of this ITB
  - The Bidder with no exceptions and/or deviations against terms and conditions will receive the maximum score
  - Bidder(s) requesting any exceptions and/or deviations shall clearly fill the Deviation Request Form and markup on the GTC.
  - In case Bidder(s) propose with its own general terms and conditions, the Bidder(s) will receive zero(0) points for this part.

### 10.2.2 Technical Bid (70%)

The factors to be considered in selecting the first eligible Bidder include, without limitation, the following:

- 1) Bidder's program for supply of design technologies;
- 2) Bidder's qualification and experience in similar project of 1,400 MWe nuclear power plants;
- 3) Project organization and qualification of the key personnel which the Bidder would propose to provide in the Service;

- 4) Completeness and effectiveness of work plan and performance method of the Services;
- 5) Warranty/Guarantee with regard to the performed services;
- 6) Quality Assurance capability;
  - Quality certificate
  - Lead auditor and qualification
  - Condition of QA manual
  - Condition of procedures for quality assurance plan
  - Implementation of internal/external QA audit
  - Completion End of QA training for QA manager or supervisor
  - Result of QA indoctrination and training for employees
  - Independence of QA organization
  - Number of QA personnel
- 7) Any other relevant factors

The Bidder is not allowed to make any protest or complaint against the evaluation result. KEPCO E&C shall be free from any liability as a result of the Bid process and evaluation, and shall not be bound to select from the Bids submitted in response to this ITB.

### 10.2.3 Technical Evaluation

For Bidder's information, please see below table which will be used for technical (Project) evaluation of this Bid.

#### 1) Evaluation Table

No	Evaluation Factors	Contents	Score	Details and score
1	Nuclear Consultation Experience	Experiences in technical consultation for the technology of nuclear power plant.	30	- Number of technical consultation projects completed in recent 10 years for Nuclear Power Plants <sup>(1)</sup>
2	Nuclear Design Experience	Experiences of in design for nuclear power plant.	30	- Number of design projects completed in recent 10 years for Nuclear Power Plants <sup>(2)</sup>

3	Available Technical Personnel	Similar Work Experience of proposed manpower for this Contract.	20	- Consulting and Engineering Experience in the Task items (10) <sup>(3)</sup> - Appropriateness of Manpower Plan (10) <sup>(4)</sup>
4	Organization	Status of Technical Organization and Manpower.	10	- Available Project Management Organization (5) <sup>(5)</sup> - Available Alternative Manpower (5) <sup>(6)</sup>
5	Quality Assurance	A copy of Certificate and Quality Manual	10	- A copy of Certificate (ASME NQA-1, ISO 9001) (5) <sup>(7)</sup> - Quality Manual (5) <sup>(8)</sup>
Total			100	

## 2) Score

Bidder's data will be evaluated according to the criteria of 'Details and score' in Table above as follows:

- (1) More than ten(10) projects: 30 points, 5 ~ 10 projects: 25 points, less than five(5) projects: 20 points
- (2) More than ten(10) projects: 30 points, 5 ~ 10 projects: 25 points, less than five(5) projects: 20 points
- (3) More than ten(10) consultation members (including manager) with experiences for the Task items: 10 points, 5 ~ 10 consultation members (including staffs) with experiences for the Task items: 7 points, less than five(5) members with experiences for the Task items: 4 points
- (4) Manpower plan conforming to the ITB: 10 points, Manpower plan not conforming to the ITB: 5 points
- (5) Project Manager appointed: 5 points, No Project Manager appointed: 2 points
- (6) Alternative manpower list provided: 5 points, No alternative manpower list provided: 2 points
- (7) All of Certificates: 5 points, 1 Certificate: 3 points, No Certificate: 1 Point
- (8) Quality Manual provided (including signature by authorized personnel, for latest issue): 5 points, No Quality Manual provided: 2 points

## 3) Total

Only Bidder(s) with technical score of 85% or more is considered to be qualified bidder for negotiation.

- Bidder who do not meet requirements below shall be disqualified.

[ Requirements ]

- Experience of new nuclear power plant architectural engineering services and technical consultation projects completed in recent 15 years
- Total Minimum Amount: US\$ 5,000,000

## 11. Contents and Composition of Bid

The Bidder shall prepare and submit its Bid to KEPCO E&C by two envelopes separating for Part I. Commercial Bid and Part II. Technical Bid as follows:

### 11.1 Part I. Commercial Bid (30%)

The Bid amount shall be shown in breakdowns in accordance with the Appendix F "Formats for Bid" based upon the instructions given below. The Bidder's salary schedule by grade shall be attached.

#### 11.1.1 Actual Base Salary (Format #1-2)

- 1) Actual Base Salary for "Billable Manhours" defined in Paragraph 11.1.4 below shall be, together with grade and estimated MH, etc., proposed in accordance with Format #1-2.
- 2) The Bidder shall propose the grade or category code of its salary schedule for each of the positions defined in Appendix D of this ITB in accordance with the qualification requirements for the assignee of each position. KEPCO E&C's qualification requirements are given in Appendix D of this ITB.

#### 11.1.2 Overhead (Format #1-3)

- 1) The coverage of the Overhead is defined in Article 4.2.2 of Section 1 in Chapter III.
- 2) Overhead rate shall be proposed separately for the following categories of services:
  - Onshore
  - Offshore
- 3) These rates should be proposed with due consideration for the items to be compensated by KEPCO E&C as Other Direct Costs, shown in Paragraph 11.1.6.

4) Fixed multipliers on Actual Base Salary shall be applied to account for the Overhead. These numbers shall not be changed during the period of this Agreement.

5) Overhead applicable on the Actual Base Salary for Billable Manhours shall be proposed in accordance with Format #1-3.

#### 11.1.3 Fee (Format #1-3)

A single number of Fee rate shall be proposed, in accordance with the Format #1-3, to be multiplied to the Actual Base Salary and Overhead to account for the Fee. This number shall not be changed during the period of this Agreement.

#### 11.1.4 Billable Manhours

Only directly engaged technical personnel approved by KEPCO E&C are billable. Bidder's Seoul Office Financial Manager, Contract Administrator including invoice work, support personnel for Onshore assignees, Bidder's personnel for the operation of its Seoul office, secretary, etc. shall not be billable.

#### 11.1.5 Aggregate Multiplier (Format #1-3)

A single number of aggregate multiplier shall be proposed using Format #1-3.

#### 11.1.6 Other Direct Costs (Formats #1-4)

The items listed in Article 4.2.5 "Agreement Amount and Compensation" of Section 1 in Chapter III shall be reimbursed. Any other items not listed in Article 4.2.5 shall not be reimbursed, which are listed in Article 4.3 "Non-Reimbursable Expenses or Costs." The Bidder shall propose the estimated amount together with the calculation breakdowns according to the Format #1-4 of Appendix F "Formats for Bid."

#### 11.1.7 Written Power of Attorney

Authorized representatives with a written power-of-attorney (Name, address, and telephone number of the authorized individuals to conduct the contract negotiation and make contractual commitments on behalf of the Bidder) shall accompany its Bid.

#### 11.1.8 Financial Statements

The Bidder is required to submit its recent 3 years' financial statements confirmed and signed by an independent certified accounting firm, including its most recent annual reports to the shareholders.

#### 11.1.9 Standard Salary Administration Policy

Bidder's Standard Salary Administration Policy including its corporate salary and wage range by grade or category code shall be submitted.

#### 11.1.10 Salary Grade and Rates (Format #2)

The Bidder is required to submit the salary grade and rates of its personnel in accordance with Appendix F, Format #2.

#### 11.1.11 Exceptions and Deviations

Any exceptions and deviations related to Section 1 in Chapter III, "General Terms and Conditions" shall be listed in the Deviation Request Format of Section 3 in Chapter III.

Bidder's submitted terms and conditions are not considered specific exceptions to the terms and conditions of this ITB and the Bid including Bidder's submitted terms and conditions as exceptions will be rejected.

#### 11.1.12 Applicable Bidder's Registration Certificate

Bidders shall submit official registration certificate which proves that the Bidder is doing its business in accordance with the legal provisions of the country in which it is established.

### 11.2 Part II. Technical Bid (70%)

The Technical Proposal shall consist of the following:

11.2.1 Bidder's proposal to supply design technologies based on Section 2 in Chapter IV.

11.2.2 Bidder's work experience similar to SHN 3&4 nuclear power plants that has been undertaken.

11.2.3 Plan for Bidder's Manpower Assignment and OTS Manhours



Using KEPCO E&C's "Suggested Plan for Task Description, Qualification and Assignment of Consultant" given in Appendix D and "Preliminary Project Organization, Organization Groups and Positions" in Appendix C as the reference, the Bidder shall submit its own proposed plan for personnel assignment, OTS manhours, Task Trip manhours, and proposed plan for position establishment, required grades, and qualification requirements which it judges to be commensurate with the Bidder's scope and responsibility described in Chapter IV of this ITB.

In preparing the Bidders' plan, Bidder:

- shall list all the "tasks" the Bidder is proposing to assign for performance of the Services defined by this ITB.
- may adjust any of the tasks given in the Appendix D.
- shall submit a table showing its own personnel grade schedule or personnel category classification code system which the Bidder employs as a system for personnel management and/or salary administration. It should be a certain numbers or codes that can be considered as a measure of experience, competency, salary level, etc. of the person.

#### 11.2.4 The Bidder's Approach for Meeting Technical Requirements of Project

The Bidder should describe its technical approach to conform to the responsibilities described in Section 2 and 3 of Chapter IV in accordance with Section 4, "Design Approach," described in Chapter I.

#### 11.2.5 Organization and Biodata

The Bidder shall submit project organization and key personnel to provide the Service. The biodata of the proposed personnel for the following key project tasks shall be presented in accordance with the Format #3.

Support Services to KEPCO E&C

- Civil Structural, GE
- Cost and Scheduling, GE
- Electrical, GE
- Instrumentation & Control, GE
- Equipment Qualification, GE
- Mechanical, GE
- Nuclear, GE
- Plant Design, GE

### Special Task

- Offshore Technical Support
- Task Trip

#### 11.2.6 Quality Assurance

- A copy of Certificate (KEPIC, ASME, ISO 9001)
- List of lead auditor and certification & qualification record
- Quality Manual (including signature by authorized personnel, for latest issue)
- Cover and List of QA related Procedures / Instructions / Standards (Latest issue)
- Annual audit plan and cover of QA audit report within the last 2 years (including signature by authorized personnel)
- Records of quality related training for QA Manager (A copy of the external training completion or evidence of training from external quality expert including training plan, training result and instructor careers, in case of Q grade, copy of nuclear QA indoctrination and training)
- Records of QA training for all employees (A copy of the training completion or evidence of training including instructor careers for internal training. Instructor should be experienced and qualified regarding nuclear quality)
- Organization Chart
- A list of QA personnel more than 2 persons and their resume

## 12. Miscellaneous

- 12.1 The Bidder is required to prepare and submit his Bid fully reflecting the Commercial Information in Chapter III, and Technical Information in Chapter IV. Bids which contain additions not called for, erasures, alterations or irregularities of any kind of which do not comply with such particular terms and conditions as Compensation, Adjustment of Compensation, Terms of Payments, Revisions, Warranty and Liability, Taxes and Customs Duties, Method of Performance and Work Procedure, Contract Language, Disputes and Arbitration shall not be accepted by KEPCO E&C.
- 12.2 In case of contradictory or conflicting statements, paragraphs, or parts of the ITB, the most favorable conditions to KEPCO E&C shall be applied.
- 12.3 KEPCO E&C may revise any part of the General Terms and Conditions in this ITB without the consent of Bidders.
- 12.4 KEPCO E&C will not authorize the expenses related to Bidder's visit to Korea for the

discussion of this ITB or contract negotiation.

- 12.5 The purpose of this ITB is only to select an eligible consultant. Accordingly, KEPCO E&C is not obligated to accept all terms and conditions of the Bids. In the event KEPCO E&C and the selected Bidder fail to reach an agreement on the contract, KEPCO E&C shall have the right to select and negotiate with another Bidder without any liability or compensation to the selected Bidder. KEPCO E&C also reserves the right to reject any and all Bids received by reason of this ITB and to negotiate separately with any source whatsoever, in any manner deemed necessary, to serve the best interest of KEPCO E&C.
- 12.6 KEPCO E&C may modify the specified terms and conditions and enlarge or reduce the scope of services during the negotiation period considering the price, general terms and conditions as specified in the Bid.
- 12.7 The Bidder shall bear all costs associated with this Bid process including but not limited to clarification of its Bid and negotiation of the contract, and KEPCO E&C will in no case be responsible or liable for those costs regardless of the conduct or outcome of the Bid review and evaluation, and contract negotiation.
- 12.8 By the Bidder's submission of Bid Documents to KEPCO E&C, the Bidder agrees to all terms in this ITB and represents and warrants its Bid Documents to be true, correct and complete.
- 12.9 KEPCO E&C will not conclude a Contract with any bidder if the bidder will not accept the performance guarantee requirements described in CHAPTER III – COMMERCIAL INFORMATION. However, the guarantee may be provided with cash deposit into KEPCO E&C's account in case both parties agree.
- 12.10 At KEPCO E&C's sole discretion, KEPCO E&C may request bidder to submit 'Certification of Matters relating to Restrictions on Conclusion of Negotiated Contracts', attached to this document as '5. Certification of Matters relating to Restrictions on Conclusion of Negotiated Contracts' in CHAPTER III – COMMERCIAL INFORMATION, prior to conclude the contract. KEPCO E&C will not conclude a Contract with the bidder if the bidder will not submit the document upon KEPCO E&C's request.
- 12.11 Bidder(s)' proposals shall be made based on TECHNICAL INFORMATION described in this ITB. No change requests on Technical Information will be accept.

# **CHAPTER III**

## **COMMERCIAL INFORMATION**

- 1. GENERAL TERMS AND CONDITIONS**
- 2. PRICE BID FORMAT**
- 3. DEVIATION REQUEST FORMAT**
- 4. PERFORMANCE GUARANTEE REQUIREMENTS**
- 5. Certification of Matters relating to Restrictions on Conclusion of Negotiated Contracts**

# 1. GENERAL TERMS AND CONDITIONS

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## **PREAMBLE**

This Consulting Services Agreement (this "Agreement") is made and entered into as of this day of \_\_\_\_, 2023 (hereinafter called the "Effective Date") by and between KEPCO Engineering & Construction Company, Inc. (hereinafter called "KEPCO E&C"), a company duly organized and existing under and by virtue of the laws of the Republic of Korea and having its principal office at 269 Hyeoksin-ro, Gimcheon-si, Gyeongsangbuk-do, 39660, the Republic of Korea and XXX (hereinafter called the "Consultant"), a company duly organized and existing under the laws of the \_\_\_\_\_ and having its principal office at \_\_\_\_\_. (KEPCO E&C and the Consultant are hereinafter referred to individually as a "Party", and collectively as the "Parties"),

## **WITNESSETH:**

WHEREAS, Korea Hydro and Nuclear Power Co., Ltd. (hereinafter called "KHNP") desires to construct nuclear power plants of total nominal capacity of 2,800 MWe consisting of two identical units, known as Shin-Hanul Nuclear Power Plant Units 3 & 4, which will be located in Uljinbuk-ro, Buk-myeon, Uljin-gun, Gyeongsangbuk-do, Korea (hereinafter called "SHN 3&4");

WHEREAS, KEPCO E&C has been designated by KHNP as a prime contractor for architect engineering services and related services for SHN 3&4 and has entered into a contract (hereinafter "Prime Contract") for such services with KHNP;

WHEREAS, KEPCO E&C desires the Consultant to provide consulting services with respect to the Prime Contract, all as specifically set forth in this Agreement and to be performed in connection with the Project as defined hereinafter;

WHEREAS, the Consultant has represented that it is an experienced architect engineering services firm in the field of nuclear power plants and has extensive experience in providing services of similar nature to the Services as defined hereinafter and that it is professionally and financially capable of providing the Services;

WHEREAS, the Parties hereto represent and warrant that their officers and representatives who have executed this Agreement on their behalf have been duly authorized to do so, and that the Parties have performed all acts legally required and necessary to enter into this Agreement; and

WHEREAS, the Parties agree that this Agreement applies to consulting services for SHN 3&4.

Now, THEREFORE, for and in consideration of the premises and the mutual covenants and agreements hereinafter set forth, the Parties hereto agree as follows:

## ARTICLE 1 - DEFINITION

The contents of this Article will be completed at the time of entering into the Agreement. Meanwhile, the definitions of terms given in Section 3 of Chapter I shall be applied.

## ARTICLE 2 - SCOPE AND TYPES OF SERVICES

Refer to Section 2 "Consultant's Scope of Services to KEPCO E&C" of Chapter IV. Technical Information.

## ARTICLE 3 - METHOD OF PERFORMANCE AND WORK PROCEDURE

Refer to Section 3 "Method of Project Implementation" of Chapter IV. Technical Information.

## ARTICLE 4 - AGREEMENT AMOUNT AND COMPENSATION

### 4.1 Agreement Amount and Manhours

Work Scope	Estimated Amount	Estimate Manhours
Consulting Services for Engineering		43,300
Training Services for KHNP personnel		
Total		

The term "Agreement Amount and Agreement Manhours" shall mean the total Estimated Amount and Estimated Manhours shown above. The Agreement Amount does not include escalation and is subject to adjustments. The parties will endeavor to control costs such that the Agreement Amount, as escalated, will not be expended prior to reaching the Agreement Manhours, and the procedures for the cost and manhour control shall be developed separately.

The agreement amount for the Training Services for KHNP personnel is not subject to escalation. The contract conditions for the Training Services shall be in accordance with Appendix G, "Training for KHNP Personnel."

## 4.2 Compensation Items

### 4.2.1 Actual Base Salaries

- 1) The Actual Base Salaries of the Consultant's personnel assigned to the tasks defined in Appendix D "Suggested Plan for Task Description, Qualification and Assignment of Consultant," and those for OTS and Task Trip work shall be compensable. Evidence of actual salaries which have been paid at the time of assignment shall be verifiable through audit as stipulated in Article 6, "Audit."

For Consultant personnel assigned Onshore (long and short term), changes to Actual Base Salaries made during the assignment period, if any, shall be submitted to KEPCO E&C before the actual billing of such revised rates, together with the reasons for the change. The Consultant shall be reimbursed based on the number of actual hours (regular and overtime) directly engaged in the performance of the Services multiplied by the Actual Base Salaries or Wages.

Actual hourly rates of Salaries and Wages are subject to change in accordance with Consultant's Standard Salary Administration Policy. Changes in the Standard Salary Administration Policy shall be subject to KEPCO E&C's prior written approval. However, the Consultant should not give any special benefits, in the adjustment of Actual Base Salaries, to the assignees for the Project.

Accordingly, the Consultant shall submit the necessary data, documenting the salary/wage increases including salary increase comparison data of Project personnel with all of the Consultant's personnel, before the submittal of an invoice with the changed salaries or wages, and/or at the time of KEPCO E&C's request. The average change to the total Actual Base Salary of the Consultant's personnel assigned to the SHN 3&4 Project shall be consistent with the average change to the total Actual Base Salary of all Consultant's personnel. Changes to Consultant's Actual Base Salary shall be subject to audit in accordance with the provision of Article 6, "Audit." The Consultant shall submit a company wide Salary and Wage Range by Category Code report following each Consultant salary review for KEPCO E&C's use in approving invoices.

- 2) Direct hours spent by the Consultant's personnel in the performance of Onshore and Offshore Services shall be compensated on the basis of time sheets which shall be approved or co-signed by KEPCO E&C's representative or counterpart as a condition for payment. However, for Offshore Services, the Consultant shall submit the time sheets to the KEPCO E&C representative for review and signature. During the period when the KEPCO E&C representative is not assigned Offshore, the signing of the time sheets may be delegated to the Consultant's representative and confirmed by KEPCO E&C representative or designee Onshore.



- 3) Sixteen (16) hours per one way trip for Onshore assignment, return and home leave and for Visiting Engineer assignment (including business trip between Korea and USA) shall be billable. However, the period of home leave, sick leave, holiday, etc. shall be non-billable.
- 4) Overtime manhours and trip manhours expended per Article 4.2.1.3) shall be counted as the use of the Agreement manhours.
- 5) The billable Category Codes of the Consultant's personnel on the Consultant's Standard Salary Administration Policy are included in Appendix \_\_\_ as part of this Agreement. The Consultant shall not bill the time charges of personnel in Category Codes other than those listed in the Consultant's Salary and Wage Range by Category Codes which is valid as of the date Consultant's services are performed. Furthermore, the Consultant shall not bill the time of the personnel who are not directly engaged in the Services and Project Director, the Consultant's secretarial staff, Offshore Accounting Division personnel or Offshore Employee Relations Division personnel including the Consultant's Seoul office Financial Manager.

#### 4.2.2 Overhead

A fixed Multiplier Rate of \_\_\_\_\_% for Onshore Services and a fixed Multiplier Rate of \_\_\_\_\_% for Offshore Services shall be applied to Actual Base Salaries as defined in Article 4.2.1 above, for all regular and overtime hours, to cover any and all overhead expenses including Statutory Benefit, Payroll Additives and any kind of insurance premiums. The manhours of Visiting Engineers (Task Trips) shall be categorized as Offshore Services for the application of the overhead multiplier rate. Furthermore, the Consultant certifies and agrees that this Overhead comprises all costs and indirect expenses which are not covered under other Paragraphs of this Article. The Fixed Overhead Multiplier Rate shall remain unchanged during the period of this Agreement.

#### 4.2.3 Fee

A fixed Multiplier Rate of \_\_\_% shall be applied to the sum of the Actual Base Salaries as defined in Article 4.2.1.1) above plus the applicable Overhead amount as defined in Article 4.2.2 above, for all regular and overtime hours, to cover any and all fees or profits. The Fixed Fee Multiplier Rate shall remain unchanged during the period of this Agreement.

#### 4.2.4 Not used

#### 4.2.5 Other Direct Costs

KEPCO E&C agrees to pay the Consultant's actual out-of-pocket expenses that are directly connected with the performance of the Services but not included in Articles 4.2.1, 4.2.2 and 4.2.3. The Consultant shall submit all reasonable vouchers or verifications of such reimbursable "Other Direct Costs," which shall be limited to the following:

##### 1) Travel Expenses:

- o Actual airfares (economy class) incurred by the Consultant's expatriates and their families (spouse and children whose age has not reached their 19th birthday for long-term assignment only) for their assignments to Onshore Services (including Visiting Engineers), their returns and their annual home leaves according to the procedure to be established by KEPCO E&C.
- o Business travel expenses shall be reimbursed as follows:
  - Airfares for Offshore business travel (from the Consultant's office to other locations) shall be reimbursed and other expenses for Offshore business travel shall be reimbursed in accordance with the Consultant's internal policy.
  - Travel expenses between the Consultant's offices (inter-office travel) are not reimbursable.
  - Onshore business travel (within the territory of Korea and from KOREA to outside of KOREA) shall be reimbursed in accordance with the procedures to be established by KEPCO E&C.
- o Ground transportation for the Consultant's personnel and dependents for Onshore relocations between Gimcheon and Site, if any.
- o All air travel shall be reimbursed based on economy class airfare, between Onshore office and Consultant's home office, using the most direct and economical route only.
- o All business travel shall require the prior written approval of KEPCO E&C.

##### 2) Visiting Engineer Per Diem

Visiting Engineer shall be paid US\$ \_\_\_\_\_ per night of stay in Korea to cover all of the business trip related expenses such as lodging, meals, transportation etc.. The per diem shall be adjusted as set forth in Article 4.2.5.7). a) below.

##### 3) Long Distance Telephone Calls

Consultant personnel shall be allowed to use KEPCO E&C's facilities. Overseas

calls (from Korea to overseas) from ROK are subject to KEPCO E&C's prior approval.

- 4) Facsimile, postage and reproduction services necessary in Korea shall be provided by KEPCO E&C for the Onshore Services.
- 5) Subcontract Services, if any, shall be at cost to the Consultant with no markups, fees, commissions or profit by the Consultant for such services. "Subcontract Services" are defined as services rendered by personnel employed by other firms, for whose services the Consultant subcontracts to meet manpower demands or to fulfill special tasks requested by KEPCO E&C during the course of the Consultant's performance of the Services.

The use of Subcontract Services shall be subject to the prior approval of KEPCO E&C. The Manhours and/or Amount expended by any subcontractor shall be regarded as the use of the Consultant's Manhours and/or Amount.

- 6) Foreign Service Premium for Onshore assignees shall be at a fixed rate of the Actual Base Salaries. The foreign service premium shall be applied only to regular billable hours:  
Long-Term assignees: \_\_\_\_\_ %  
Short-Term assignees: \_\_\_\_\_ %

Consultant personnel in a Visiting Engineer status shall not receive a foreign service premium.

- 7) Support Services and Facilities

Each party's responsibilities for Onshore (KEPCO E&C Home office) support services and facilities are defined in Appendix E, "Support Services and Facilities." The Consultant shall be paid in accordance with the following Paragraphs or provided with facilities or services in accordance with Appendix E, "Support Services and Facilities."

a) Living Allowances for Gimcheon and Site

In the event that the Consultant's assignees reside in Gimcheon or Site, a Living Allowance shall be paid to cover the supplemental expenses for housing, transportation and furniture.

o Living Allowance for Gimcheon

A Living Allowance of \_\_\_\_\_ Korean won per month

o Living Allowance for Site

A Living Allowance of \_\_\_\_\_ Korean won per month

The counting period of Living Allowance shall be from the first actual working day to the last actual working day.

As used hereinafter, Allowance shall mean both Gimcheon Living Allowance and Site Living Allowance for housing, transportation and furniture.

At the beginning of each long term or short term assignment for new employees or site to Gimcheon area transferees, the initial Allowance payment shall be for three (3) months or for the duration of the assignment, whichever is shorter, and then shall be paid monthly thereafter beginning with the forth (4th) month.

If the days used by Onshore assignees for the vacation, home leave, sick days, time-off, etc. other than Saturdays, Sundays, Holidays and KEPCO E&C holidays exceed cumulative thirty (30) days for every one year counting from his first working day of the project, the Living Allowance shall not be paid for the exceeding days more than thirty (30) days.

In the event that Onshore assignees' consecutive absent period is longer than thirty (30) days, the Allowance shall not be paid for the period of absence.

The Allowance shall be paid on a pro-rata basis for the partial months due to assignment start or termination date. The Allowance and the Visiting Engineer Per Diem shall be subject to annual adjustment for escalation.

The first adjustment shall be made on the first day of the first month following the first anniversary of the Agreement Signature Month ("ASM"). Thereafter, adjustments shall be made annually on the anniversary of the first adjustment date until completion of this Agreement, using the following procedure.

The indices applicable for Gimcheon Living Allowance, Site Living Allowance and

Visiting Engineer Per Diem shall be the "Actual Rentals for Housing" of "Consumer Price Indexes" of "Prices" of Economic Statistics System (ECOS, <http://ecos.bok.or.kr>) as published by the Bank of Korea.

The adjusted Allowances and Per Diem will be calculated using the following formula and will be valid for one year:

o Gimcheon Living Allowance and Site Living Allowance

2023 Living Allowance (LA) = Gimcheon and Site LA are \_\_\_\_\_, \_\_\_\_\_ Korean Won/month respectively, for a period of ASM 2023 through the last day of ASM 2024.

- 2024 Gimcheon LA for one year from the first day of the month following ASM 2024 to the last day of ASM 2025

$$2024 \text{ Gimcheon LA} = 2023 \text{ LA} \times \frac{\text{AR for 2023}}{\text{AR for 2022}}$$

- 2024 Site LA for one year from the first day of the month following ASM 2024 to the last day of ASM 2025

$$2024 \text{ Site LA} = 2023 \text{ LA} \times \frac{\text{AR for 2023}}{\text{AR for 2022}}$$

o Visiting Engineer Per Diem (PDM)

2023 PDM = Visiting Engineer's Per Diem set forth in Article 4.2.5.2) for the period of ASM 2023 through the month of ASM 2024.

2024 PDM for one year from the first day of the month following ASM 2024 to the last day of ASM 2025

$$2024 \text{ PDM} = 2023 \text{ PDM} \times \frac{\text{AR for 2023}}{\text{AR for 2022}}$$

\* Where

AR = The average rate of the indices set forth in Article 4.2.5.7).a) for adjustment of Living Allowance and Visiting Engineer's Per Diem for the entire months of the corresponding year

The same manner shall be applied for the escalation adjustment for the ensuing years annually.

b) Education Reimbursement For Children

- o Only for Gimcheon and Site assignees, actual tuition fee, enrollment fee and commutation fee shall be reimbursed. The applicable grades for education reimbursement shall be from 1st grade to 8th grade only.
- o No compensation shall be made for short term expatriates or for long term expatriates assigned on single appointment, or for Offshore assignees.

#### 4.3 Non-Reimbursable Expenses or Costs

Expenses which shall not be reimbursed as Other Direct Costs include, without limitation, the following:

- (1) Deposits of any kind;
- (2) Interest on money borrowed;
- (3) Contributions and donations;
- (4) Fines and penalties;
- (5) Entertainment expenses;
- (6) Any taxes levied by an appropriate taxing authority on income, bonuses or incentive compensation of the Consultant's personnel, except as specifically provided in Article 9, "Taxes and Customs Duties;"

- (7) Any taxes levied on corporate income, individual income or excess profits and similar taxes, except as specifically provided in Article 9, "Taxes and Customs Duties;"
- (8) Overseas bonuses except for the foreign service premium allowed in Article 4.2.5.6) above;
- (9) Cost differential allowance for the Consultant's expatriate personnel;
- (10) Bonuses paid to employees;
- (11) All ground transportation involved in relocations between Korea and the Consultant's country;
- (12) Communications expenses, reproductions and mailing costs incurred in the Consultant's office;
- (13) Insurance premiums of any kind, including Worker's Compensation Insurance;
- (14) All paid absences and annual leaves;
- (15) All in-transit or en-route allowances;
- (16) Excess baggage charges for initial and final trips before and after Onshore assignment;
- (17) Predeparture and return living expenses including additional costs for temporary accommodation in Korea and the Consultant's country not covered by the Living Allowance;
- (18) Packing and moving to storage of household goods;

- (19) Monthly storage and insurance for household goods;
- (20) Return of stored household goods at assignment end;
- (21) Predeparture medical examinations and shots and return medical examinations;
- (22) Tax interview and withholding calculations;
- (23) Passport and visa related expenses for Onshore assignment;
- (24) All other costs and expenses related to the Consultant's operation of its own Onshore office or Onshore permanent establishment;
- (25) Freight charges and insurance for personal effects; and
- (26) Expenses for licenses, permits, authorizations to do business in Korea.

## ARTICLE 5 TERMS OF PAYMENT

### 5.1 Payment for the Consultant's Compensation

KEPCO E&C shall pay the Consultant the compensation monthly in accordance with the following provisions;

#### 5.1.1 Monthly Payment

The Consultant shall invoice to KEPCO E&C its compensation monthly as follows:

- 1) Actual Base Salaries of the Consultant's technical and support personnel for the billable manhours (as allowed by Article 4, "Agreement Amount and Compensation") expended during the preceding calendar month.



- 2) Plus Overhead which comes out by applying the Overhead Multipliers to the applicable billable Actual Base Salaries expended in Article 5.1.1.1) above to cover overhead as stipulated in Article 4.2.2.
- 3) Plus Fee which comes out by applying the Fixed Fee Multiplier to the sum of the Actual Base Salaries expended in Article 5.1.1.1) and the Overhead in Article 5.1.1.2) above to cover fee as stipulated in Article 4.2.3."
- 4) Plus Other Direct Costs in Article 4.2.5, necessary procedures may be mutually developed for the detailed execution of Other Direct Costs.
- 5) Additional manhours which are caused by the reasons set forth in Article 7 "Revisions," which have been mutually agreed upon as stated in the said Article shall be recorded by the Parties.

## 5.2 Method of Payment

- 5.2.1 On or about the fifteenth (15th) day of each calendar month, the Consultant shall submit to KEPCO E&C a monthly invoice in a form acceptable to KEPCO E&C showing the breakdown of all items in Article 5.1.1 above.
- 5.2.2 Upon receipt of the invoice, KEPCO E&C shall review the invoice and pay the amount to the Consultant into the bank account selected by the Consultant. Payment shall be made to the Consultant within forty-five (45) days from the date of receiving the invoice by electronic wire transfer.

Should any adjustment be necessary as a result of questioned or disallowed items or from an audit being performed as provided in Article 6 "Audit," such adjustment shall be added to or deducted from, as the case may be, any following monthly invoice. If there remains a questioned item, KEPCO E&C reserves the right to withhold payment for the items in question.

Notwithstanding anything to the contrary, Consultant's invoice shall not be paid until and unless the Performance Bond described in Article 26 is submitted to KEPCO E&C.

- 5.2.3 If any payment due date does not fall on a banking day in the Republic of Korea or the United States of America, then the payment will be made on the next banking day in both the Republic of Korea and the United States of America.

5.2.4 All invoices shall be supported by such documentation as time sheets, receipts, vouchers, calculation breakdown and any other items as may be required by KEPCO E&C to verify the amount or to support the Consultant's request for payment.

5.2.5 All banking charges incurred outside of Korea shall be for the Consultant's account.

### 5.3 Accounting Statement

Upon the receipt of the acceptance notice of the Services as provided in Article 25, "Acceptance of Services," the Consultant shall submit to KEPCO E&C an accounting statement showing the breakdown of reimbursed costs paid by KEPCO E&C up to that time.

### 5.4 Currencies

The costs incurred in U.S. dollars and third country's currency shall be paid in U.S. dollars at the place or places to be agreed upon between KEPCO E&C and the Consultant. All of the reimbursable costs incurred in currencies other than U.S. dollars will be billed in U.S. dollars at the Telegraphic Transfer buying rate of exchange as quoted for commercial transactions by the Korea Exchange bank, in effect on the date of invoice.

The Korean Won costs shall be invoiced in Korean Won and paid at such place or places in the Republic of Korea to be agreed upon between KEPCO E&C and the Consultant.

## ARTICLE 6 - AUDIT

6.1 In determining the amount of compensation payable to the Consultant hereunder, the Consultant shall maintain books, records, documents, employees salary/wage history information and other supporting data relating to the cost of the Services in accordance with generally accepted accounting principles and practices consistently applied.

- 6.2 Until twenty-four (24) months after the date of completion of the Consultant's Services, KEPCO E&C has the right to examine and audit such books, records, documents, employees salary/wage history information and other supporting data of the Consultant during business hours and for a reasonable length of time as shall be necessary in the judgment of KEPCO E&C to audit and verify the costs involved by the Consultant payable under Article 4, "Agreement Amount and Compensation."
- 6.3 The right to examine and audit hereunder shall include the right to make extracts or copies as applicable of any books, records, documents, employee salary/wage history information and other supporting data reasonably necessary to substantiate costs payable under Article 4, "Agreement Amount and Compensation."
- 6.4 The manhours and expenses incurred by the Consultant for the support of such audits shall not be compensated.
- 6.5 The Consultant shall provide adequate facilities including reasonably required office space for such audits at no additional cost to KEPCO E&C.

## ARTICLE 7 – REVISIONS

### 7.1 Scope and Manhour Revisions

- 7.1.1 KEPCO E&C may direct and the Consultant may propose revisions in the scope or the quantity (MH) of the Consultant's Services.
- 7.1.2 Any revisions in the Consultant's Services directed or approved by KEPCO E&C shall be presented to the Consultant in writing and the Consultant shall notify KEPCO E&C of any possible increase or decrease in manhours and costs, along with any possible effect on schedule that may result from such revisions.

The Consultant shall proceed with such revisions only in accordance with the applicable conditions of Article 11, "Warranty and Liability," and within the shortest time practicable, after receipt of written instructions from KEPCO E&C to proceed.

- 7.1.3 The Agreement Manhours and the Agreement Amount shall be adjusted based upon the number of the Consultant's manhours, and associated amounts corresponding to the revisions stated in Article 7.1.2 as agreed upon by the parties.

- 7.1.4 Any revisions which add to the Consultant's Services shall be compensated in accordance with Article 5, "Terms of Payment." The Consultant shall not be compensated for any revisions which are not authorized in writing by KEPCO E&C.
- 7.1.5 For revisions which result in the reduction of the Consultant's Services, an adjustment in the Agreement Manhours and Agreement Amount shall be made in accordance with Article 7.1.3.
- 7.1.6 The Consultant agrees that the existence of any dispute concerning the Consultant's entitlement to an adjustment for any revision, or concerning the amount of compensation or schedule adjustment, shall not excuse the Consultant from continuing to perform the Services, including the disputed portion of the Services.
- 7.2 Adjustment of Agreement Amount

At every twelve (12) month interval after the signing of this Agreement, or when KEPCO E&C so requests, the Consultant shall calculate the escalation amount of Labor Cost and the forecast of Other Direct Cost and submit those amounts and data to KEPCO E&C; provided, that the aggregate adjustment for escalation shall not exceed five percent (5%) per annum for balance of the contract duration. However, considering the required time for adjusting and calculating new Agreement Amount, any formal adjustment of the Agreement Amount shall be made no later than the exhaustion of the total Agreement Amount.

## ARTICLE 8 - FORCE MAJEURE

- 8.1 No Party shall be in default or shall be liable for any loss or damage due to delay in, or prevention of, the performance of its obligations under this Agreement if such delay or prevention results directly from the causes beyond the control and without fault or negligence of the party or its subcontractors. (such an event, an "Force Majeure"). The causes beyond their control shall include the following:
- 1) Acts of God such as storms, floods or earthquakes;
  - 2) Civil disturbances, such as riots, strikes, revolutions, rebellions or insurrections;
  - 3) Accidents or disruptions, such as fires or explosions;

- 4) Any acts, laws, decrees, priorities, orders or regulations of any governmental authority (national or local) including embargoes, quarantines, prohibitions of trade (including delays or failure to act), and delays or failures to issue any necessary license, permit or export or import authorization; or
- 5) Hostilities, invasions, wars (declared or not), or nuclear incidents.

8.2 In the event of any causes set forth in Article 8.1 above which in whole or in part prevents either Party from performance of its obligations under this Agreement, the said Party shall inform the other in writing as soon as possible but not later than five (5) working days, and within fifteen (15) working days from the beginning date of the Force Majeure the said Party shall provide with:

- 1) Evidence of the Force Majeure;
- 2) The anticipated duration of the Force majeure; and
- 3) The action or proposed action to be taken by the notifying Party to minimize the effect of such Force Majeure and the disability resulting therefrom.

The notifying Party shall promptly notify the other Party of any change in the nature of or the cessation of the Force Majeure. The time schedule for completion of the Consultant's Services or any part thereof shall be extended for a period of time reflecting the effect of the Force Majeure.

8.3 KEPCO E&C shall reimburse the Consultant for any costs incurred in efforts to recover any time lost in the Project resulting from any causes set forth in Article 8.1 above, provided that the attempt to recover such time is requested in writing by KEPCO E&C. KEPCO E&C and the Consultant, shall agree upon the number of the Consultant's additional manhours required to overcome the effect of the Force Majeure and the Consultant shall exercise all reasonable efforts to minimize such additional manhours and costs.

The Agreement Manhours and Agreement Amount for the Consultant's Services shall be adjusted in accordance with Article 7.1.3.

## ARTICLE 9 - TAXES AND CUSTOMS DUTIES

- 9.1 Except as otherwise specifically provided in this Article, the Consultant, as part of its performance of the Services, shall be responsible for the payment of all taxes, duties, tariffs, fees, imposts, excise or other customs duties or taxes assessed upon the Consultant by any taxing authority outside and inside the Republic of Korea.
- 9.2 The Consultant, as part of its performance of the Services, shall assume payment of duties, tariffs, excise and other taxes of a similar nature, imposed by the government of the Republic of Korea on Business Effects necessary to the performance of the Services or any Work Product, and KEPCO E&C shall reimburse the Consultant for the amount of such duties, tariffs, excise and other taxes of a similar nature upon presentation of an invoice therefor together with any supporting documentation KEPCO E&C may reasonably require or KEPCO E&C shall directly pay such amount to the concerned organizations or authorities.

However, any taxes and custom duties on motor vehicles and gasoline, materials or equipment for the Consultant's own office, Personal Effects of the Consultant's personnel, household commodities, commissary supplies and goods for the Consultant's Seoul office shall be for the account of the Consultant. Value Added Tax (VAT), if any, imposed by the Korean Government authorities in connection with the Services supplied by the Consultant under this Agreement shall be in accordance with Value Added Tax Law of the Republic of Korea.

- 9.3 All individual income taxes, franchise taxes, corporate income taxes, payroll taxes and social benefits or similar assessments imposed by the relevant tax authorities upon the Consultant or any personnel employed by the Consultant shall be for the account of the Consultant.
- 9.4 The Consultant shall fully comply with the legal and accounting requirement of all present and future governmental laws, rules and regulations regarding taxes or duties, including the making of all withholdings and collections and payment thereof to the relevant tax authorities and filing of all reports and information, and the Consultant shall be liable for all penalties, interest and additive taxes of any nature which are assessed against the Consultant or its employees as a result of the Consultant's failure to observe and fulfill such requirements and responsibilities.

- 9.5 The Consultant shall be responsible for filing and applying for all tax exemptions allowed by law. If the Consultant's tax liability is increased because of its failure to apply for any such exemptions, such increase shall not be reimbursed under any provision of this Article 9, "Taxes and Customs Duties." KEPCO E&C, however, will provide the Consultant with reasonable information or assistance, if available, at the request of the Consultant.
- 9.6 The Consultant shall file taxes through its permanent establishment in Korea for the performance of the Services and submit the document evidencing the registration of a permanent establishment in Korea at the time of the Consultant's first invoice.

## ARTICLE 10 - INSURANCE AND INDEMNITY

### 10.1 INSURANCE PROVIDED BY THE CONSULTANT

10.1.1 The Consultant, as part of its performance of the Services, shall obtain, maintain and be responsible for premium payments for the following forms of insurance. The premiums shall be for the account of the Consultant. Within thirty (30) Days of the Effective Date of the Agreement, the Consultant shall provide KEPCO E&C with an insurance certificate, demonstrating the following coverages:

- 1) Worker's Compensation Insurance  
Worker's Compensation Insurance for all of the Consultant's employees as required by national laws of the country in which the Consultant's employees are assigned to accomplish the Services. If any of the Services hereunder is subcontracted, the Consultant shall require its subcontractors to provide Worker's Compensation Insurance for the latter's employees in accordance with the foregoing, unless such employees are covered under the Consultant's Insurance.
- 2) Commercial General Liability Insurance  
Commercial General Liability fully to cover the Consultant's liability to third parties or the public for personal injury or death or for loss or damage to property excluding loss or damage resulting from nuclear incident.

If any of the Services are subcontracted, the foregoing requirement shall be passed to the said subcontractor.

3) Automobile Liability Insurance

Automobile Liability Insurance, for personal injury, death and loss or damage to property for any accident arising out of the ownership or use by the Consultant of automobiles during the performance of the Services.

10.1.2 KEPCO E&C undertakes no responsibility in respect of any life, health, accident, travel and other insurance which may be necessary or desirable for the personnel associated with the Consultant for the purpose of performing the Services, nor for such members of the families of any such personnel as may travel to or from Korea or elsewhere.

10.1.3 The Consultant shall secure, from the insurance carriers providing the Commercial General Liability and Automobile Liability Insurance policies, their agreement to waive their right of subrogation against KEPCO E&C, KHNP and their employees.

10.1.4 Before the Consultant begins the performance of the Onshore Services, the Consultant shall have its insurance carrier or carriers and shall furnish KEPCO E&C with certificates evidencing that each of the insurances required of the Consultant under the Agreement is in full force and effect. The certificates for the Commercial General Liability and Automobile Liability Insurance policies shall show the interest of KEPCO E&C as an additionally named insured party and recite the expiration date of each policy. The identical requirement shall also apply to all of the Consultant's subcontractors prior to their respective commencement of the Onshore Services. In the event of cancellation or nonrenewal and policy of which the certification has been furnished to KEPCO E&C, the Consultant shall provide thirty (30) days prior written notice to KEPCO E&C regarding its planned cancellation or nonrenewal.

10.1.5 The Consultant shall be responsible for all policy conditions, exclusions and deductibles under the insurances, and the Consultant shall provide financial protection pursuant to Article 10.1.1.

## 10.2 Indemnity

10.2.1 The Consultant shall indemnify, defend, and hold harmless KEPCO E&C and their successors and assigns, their directors, officers, agents and employees from and against any and all claims for loss or damages including bodily injury or death suffered by anyone whomsoever, or property damage, arising directly or indirectly or claimed to arise out of the Consultant's negligent conduct or negligent performance of the



Packaged Production and/or Packaged Review Services or resulting from the negligent performance by the Consultant's employees or subcontractors in the performance of the Packaged Production and/or Packaged Review Services, except for those damages, including bodily injury, death and property damage, caused by or arising out of the gross negligence or willful misconduct of KEPCO E&C and their employees.

Furthermore, the Consultant, at its own expense, shall defend any suit or action brought against KEPCO E&C and its successors and assigns, directors, officers, agents or employees, based on such claims, losses and damages and shall pay all such judgments against KEPCO E&C including reasonable attorney's fees and expenses arising or resulting therefrom. The Consultant shall keep KEPCO E&C fully informed of the progress of any such suits or actions, and shall agree to consult with KEPCO E&C at all reasonable times in regard to the progress of such suits or actions.

Notwithstanding any other provision of the Agreement, Consultant's indemnification and hold harmless obligations shall remain in full force and effect until the expiration of a period of three years after the termination of the Agreement or commercial operation date of SHN 3&4, whichever is later.

10.2.2 KEPCO E&C hereby indemnifies and holds the Consultant and its subcontractors harmless from and against any nuclear liability to third parties resulting from the operation of a nuclear reactor or the like as defined in the Nuclear Damage Compensation Law of the Republic of Korea and/or from the engineering and design services, engineering management services, technical support services related to the nuclear reactor, provided by the Consultant and its subcontractors.

It is further agreed that this indemnification will not be applicable to the Consultant, its subcontractors or their employees when nuclear loss or damage is caused by willful misconduct or gross negligence of the Consultant, its subcontractors or their employees in providing Packaged Production and/or Packaged Review and/or Advisory and/or Non-Packaged Production Services and KEPCO E&C shall have the right to claim for damages in accordance with the Nuclear Damage Compensation Law.

## ARTICLE 11 - WARRANTY AND LIABILITY

### 11.1 Warranty Type

Under this Agreement, the Consultant has a solitary obligation to KEPCO E&C, wherein the Consultant is bound for the entire damages or for the fulfillment of the warranties set forth in Article 11.2 through 11.9. Professional Responsibility as used in this Agreement means the responsibility for conforming to the conditions of Articles 11.2 through 11.6.

### 11.2 Performance Warranty for Packaged Review Services and Packaged Production Services

The Packaged Review Services and Packaged Production Services shall be performed under the Consultant's control and direction and the Consultant shall have Professional Responsibility for the work. To confirm that Packaged Production Services and Packaged Review Services are performed in accordance with Consultant's control and direction, the Consultant shall provide their internal procedure upon request by KEPCO E&C.

#### 11.2.1 The Consultant warrants that:

- 1) It shall furnish the Services of competent and professionally qualified personnel;
- 2) The documents prepared under Packaged Review Services shall not have any gross technical errors or gross defects;
- 3) For Packaged Production Services, the Consultant shall be totally responsible for the completeness and correctness of the work whereas KEPCO E&C shall only be responsible for the coordination and integration of the tasks with other associated parts of the project implementation;

The standard for determining whether the Consultant has breached this warranty shall be whether or not the Consultant's personnel performed such Services in accordance with sound and currently acceptable engineering and management standards, practices, procedures, laws and regulations applicable to the performance of the Services. KEPCO E&C shall decide whether the Services were satisfactorily performed in accordance with this Paragraph.

- 11.2.2 In the event that any of the Consultant's Services do not conform to the standards set forth in Article 11.2.1 during the period from the effective date of this Agreement up to the date of expiration of KEPCO E&C's corresponding warranty obligations to KHNP under the Prime Contract, the Consultant shall, at the Consultant's own expense, upon receipt of written notice from KEPCO E&C, perform any additional services necessary to correct the non-conformance so that negligent errors or omissions therein are removed to the complete satisfaction of KEPCO E&C in the course of such reperformance of the Consultant's Services. Furthermore, the applicable reperfomed Services shall be subject to the warranties of this Agreement.
- 11.2.3 The Consultant shall be responsible for the losses or damages to the products of the Services incurred before the delivery or transfer of such products to KEPCO E&C except in a case stipulated otherwise in this Agreement.
- 11.3 Not Used.
- 11.4 Warranty of Title
- 11.4.1 The Consultant warrants that any design, engineering, data and documents furnished hereunder shall be delivered free from any and all rightful, legitimate, and proven claims, demands, liens and encumbrances of titles.
- 11.4.2 In the event that any design, engineering, data or documents fail to comply with this warranty, the Consultant shall defend the title thereto including, if necessary, the prompt replacement of design, engineering, data or documents and save KEPCO E&C harmless from or reimburse all losses, damages, and liabilities arising out of such failure. This warranty shall survive any termination or expiration of this Agreement.
- 11.5 Licensing Warranty
- 11.5.1 The Consultant warrants that the Services provided hereunder shall comply with all applicable codes, standards, rules, and regulations as defined in Article 32, "Codes, Standards, Regulations, and Regulatory Guides" and shall be licensable in U.S.A. in applying the codes and standards current as of December 31, 2021.
- 11.5.2 In the event the Consultant's Services fail to meet the requirements of Article 11.5.1, the Consultant's obligation shall include reperforming of the non-conforming Services to fulfill the requirements of Article 11.5.1.

## 11.6 Direct Damages Liability for Packaged Review Services and Packaged Production Services

In addition to the reperformance of the non-conforming services as set forth in Article 11.2.2, the Consultant shall be liable for and reimburse KEPCO E&C and KHNP for the cost of negligently procured equipment and material and for the cost of corrective construction, repair and replacement of equipment and material caused by Consultant's negligent performance or failure to perform in accordance with generally accepted practices or by the Consultant's failure to reperform the non-conforming services as set forth in Article 11.2.2.

## 11.7 Limitation of Liability for All Services

The Consultant's aggregate limit of liability for the Project, arising from any cause arisen from the Services rendered under this Agreement, shall not exceed one-hundred (100) percent of the Agreement Amount set forth in Article 4.

In no event, however, shall the Consultant at any time be liable for any additional, special, incidental or consequential damages including loss of profits, loss of revenue, loss of use, loss of capital, claims of customers, cost of purchased or replaced power, whether based on this Agreement, tort, negligence, strict liability or otherwise, and arising from any cause arisen from the Services rendered under this Agreement.

Notwithstanding anything to the contrary, the limitation of liability for the Consultant shall not apply (1) in the event of the Consultant's gross negligence and/or willful misconduct, or (2) to claims for indemnification under ARTICLE 10.2 Indemnity and/or ARTICLE 22 - INFRINGEMENT OF PATENTS.

## 11.8 Best Efforts Warranty for Advisory Services and Non-Packaged Production Services.

The Advisory Services and Non-Packaged Production Services shall be performed by the Consultant's personnel under the direction of KEPCO E&C.

- 11.8.1 The Consultant warrants that it shall furnish the Services of competent and professionally qualified personnel. The standard for determining whether the Consultant has breached this warranty shall be whether or not the Consultant's personnel used Best Efforts in performing the Services. KEPCO E&C shall decide whether the Services were satisfactorily performed in accordance with this Article.

11.8.2 In the event that any of the Services provided by the Consultant's personnel do not conform to the standard set forth in Article 11.8.1, as determined by the criteria established in accordance with Article 30, "Assignment and Termination of the Consultant Personnel," such personnel shall be subject to dismissal from the Project. The Consultant shall bear all the additional expenses associated with the return of the dismissed personnel and his or her dependents to the United States and the initial mobilization expenses of the replacement, if such replacement is approved by KEPCO E&C. The manhour, housing, transportation and furniture allowance, and any other charges related to the assignment for the replacement of peronnel will be paid in the same amount as if the original personnel had not been dismissed.

## 11.9 Warranty Period

The warranty period for all of the Consultant's warranty obligations, except such case as described in Article 11.4 "Warranty of Title," under this Agreement shall end thirty-six (36) months from the later of Acceptance of Services or Scheduled Completion Date of SHN Unit 4.

## ARTICLE 12 - LICENSE AND OWNERSHIP OF DATA AND PROPRIETARY INFORMATION

12.1 The Consultant agrees that KEPCO E&C shall have the right to use, without further payments other than compensation under this Contract, the project reports, technical documents of any kind, plans, drawings, designs, manuals, the Consultant's computer programs, lists of materials, calculations, study work, specifications and other documents, data and information and know-how transferred or licensed to KEPCO E&C.

12.2 KEPCO E&C may disclose such materials or data to the appropriate governmental authorities having specific jurisdiction or, if required for the performance of the Project, to third parties such as equipment vendors.

12.3 All reports, technical documents of any kind, plans, drawings, designs manuals, computer programs, lists of materials, calculations, study work, specifications and other documents, data and information and know-how developed during the Project as part of the Services ("Work Product") shall be the exclusive property of KEPCO E&C. KEPCO E&C shall have unrestricted right to use such information for any

purposes whatsoever including the use for other projects during and after the completion of the Project.

The Consultant shall retain ownership rights in its standards, computer programs, reference materials, drawings, etc. i.e. its engineering tools, which existed before the commencement of the Services and which are used in connection with the Services under this Agreement.

- 12.4 To the extent that KEPCO E&C uses any Work Product in connection with any facility other than Shin-Hanul Units 3&4, KEPCO E&C releases the Consultant and its subcontractors from any and all liabilities to KEPCO E&C and shall defend, indemnify and hold the Consultant and its subcontractors harmless from any and all third party claims that may arise as a result of such use.
- 12.5 The Consultant shall return all data and information furnished by KEPCO E&C to the extent requested upon completion of the Services or termination of this Agreement. The Consultant releases KEPCO E&C from any and all liabilities to the Consultant with respect to the use of such information for purposes other than those related to the Project. Furthermore, the Consultant shall defend, indemnify and hold KEPCO E&C harmless from any and all third party claims that may arise as a result of such use.
- 12.6 KEPCO E&C may designate all of providing information as proprietary or confidential.
- 12.7 Proprietary or confidential information provided and designated as such by the providing Party shall be held in confidence by the receiving party and shall not be disclosed to others without prior written consent of the providing Party. The receiving party shall make all reasonable efforts to keep the proprietary or confidential information in confidence and shall be liable to the providing Party for damages suffered as a result of the receiving party's failure to make all reasonable efforts to keep proprietary or confidential information in confidence. This clause shall not be applied to the information and documents which can be shown by the receiving party to have been known to the receiving Party at the time of disclosure, which becomes or will become available to the public through no fault of the receiving Party, or which is disclosed to the receiving Party by a third party having no secrecy obligations toward either Party.
- 12.8 KEPCO E&C's and the Consultant's obligations under this Article 12, "License and Ownership of Data and Proprietary Information," shall survive the termination of this Agreement.

## ARTICLE 13 - GOVERNING LAW

- 13.1 All discrepancies, controversies or differences, or the validity, construction and performance of the Agreement shall be governed by and interpreted in accordance with the laws of Korea, without regard to its conflict of laws principles.
- 13.2 The Consultant and its employees and subcontractors, if any, shall observe and abide by those Korean laws, rules, regulations and decrees of any regulatory body acting thereunder that are applicable to the performance of the Services and that are in effect at the time such Services are rendered and shall be fully liable for any violation thereof.

## ARTICLE 14 - DISPUTES AND ARBITRATION

- 14.1 Except as otherwise provided in this Agreement, any dispute concerning a question of fact arising under this Agreement which is not disposed of by agreement between the Parties, shall be decided by KEPCO E&C. The decision shall be final and conclusive unless, within thirty (30) days from the date of receipt of the notice thereof, the Consultant makes to KEPCO E&C a written appeal.  
In the event that any dispute concerning a question of fact cannot be disposed of by agreement between the Parties after such written appeal by the Consultant, then such dispute of fact shall be finally settled by arbitration as described below.
- 14.2 Any other claims, disagreements, questions or breach arising out of or relating to this Agreement, the breach thereof, or as to the obligation of any Party under this Agreement or the interpretation of any provision thereof, if not settled by mutual agreement, shall, at the option of the initiating Party and upon written notice to the other Party, be finally settled by arbitration.  
The arbitration shall take place in Seoul, Korea in accordance with the International Arbitration Rules of the Korean Commercial Arbitration Board and under the laws of the Republic of Korea.
- 14.3 In construing and interpreting the Terms and Conditions of this Agreement, the arbitrators shall reach their decisions in accordance with the following:
- a) The literal meaning of the wording of this Agreement; or, if ambiguous,
  - b) The intent of the Parties as revealed by this Agreement as a whole or, if still ambiguous;
  - c) The laws and regulations of the ROK

- 14.4 Each Party shall bear its own expense with respect to any arbitration, and the compensation and expenses of the arbitrators shall be borne in such manner as may be specified in the decision of the arbitrators.
- 14.5 From the date of any dispute, disagreement or difference arising to the date that the matter in question is settled by arbitration, KEPCO E&C's interpretation shall prevail and the Consultant shall comply with KEPCO E&C's interpretation and shall continue to fulfill its obligations under this Agreement in good faith during the pendency of any arbitration and shall not be entitled to suspend or cease the fulfillment of its contractual obligations hereunder.
- 14.6 The arbitration decision shall be final and irrevocable and both parties hereto expressly and unreservedly agree to be bound thereby. Judgment upon any award rendered by such arbitration may be entered in any court having jurisdiction, or application may be made to such court for a judicial acceptance of the award or an order of enforcement as the case may be.

## ARTICLE 15 - SUSPENSION AND EXTENSION

- 15.1 KEPCO E&C shall have the right to suspend or extend the completion of the Services for any reason upon thirty (30) days prior written notice to the Consultant.
- 15.2 Completion of the Services shall be extended by a period of time reflecting the effect of the suspension or extension. Except as otherwise provided in this Agreement, KEPCO E&C shall pay the Consultant for expenses incurred by the Consultant if the suspension or extension which are not caused by the Consultant and last within forty-five (45) days upon receipt of the Consultant's invoices.

The Consultant's invoice shall be based on actual charges related to such suspension or extension unless otherwise directed by KEPCO E&C. The Consultant shall exert all reasonable effort to minimize the charges to KEPCO E&C during such suspension or extension. KEPCO E&C and the Consultant shall agree upon the number of the Consultant's additional manhours required to reflect the effect of the suspensions and extensions under the Agreement.

- 15.3 The Consultant shall resume the suspended Services within the earliest possible date after receipt of KEPCO E&C's request to do so, but no later than thirty (30) calendar days following receipt of such notice.



## ARTICLE 16 - TERMINATION

### 16.1 Termination for Default

16.1.1 KEPCO E&C may terminate this Agreement if:

- 1) The Consultant goes into liquidation, bankruptcy or insolvency, or any proceeding, voluntary or involuntary, is initiated against the Consultant, or the Consultant makes a general assignment for the benefit of its creditors or the Consultant ceases to carry on its business; or
- 2) The Consultant fails to comply with or disregards applicable statutes, laws or regulations of countries having jurisdiction over the Consultant or the Services, fails to perform the Services for which the Consultant has Professional Responsibility with skill and diligence, fails to correct deficiencies in the Services for which the Consultant has Professional Responsibility or commits a breach of its undertakings or warranty hereunder and thereafter fails to take prompt steps fully to remedy such within thirty (30) calendar days after receipt of written notice from KEPCO E&C.

16.1.2 In any of the foregoing cases, as described in Article 16.1.1, KEPCO E&C may, upon written notice to the Consultant, terminate this Agreement and thereupon the Consultant's Scope of Services shall, including all materials, data, and equipment in the Consultant's possession for use on the SHN 3&4 Project, be transferred to KEPCO E&C at no cost to KEPCO E&C and KEPCO E&C may withhold further payments to the Consultant. KEPCO E&C will require the Consultant to cease and desist from further work.

16.1.3 In the event of such termination, the Consultant shall be liable to KEPCO E&C for all loss, damages and expenses as result of such termination. Such Consultant's liability shall be subject to the limitation specified in Article 11, "Warranty and Liability" and particularly in Article 11.7.

### 16.2 Termination for Convenience

16.2.1 KEPCO E&C may terminate this Agreement and the Services, in whole or in part, at any time and without cause and for its own convenience, by giving the Consultant a fifteen (15) day's notice in writing of termination for convenience, specifying the extent

to which this Agreement or Services are terminated and the date upon which such termination becomes effective. After receiving such notice of termination and except as otherwise directed by KEPCO E&C, the Consultant shall:

- 1) Stop the Services on the date and to the extent specified;
- 2) Place no further orders or subcontracts as may be necessary for completing such portions of the Services that have been terminated;
- 3) Terminate all orders and subcontracts to the extent that they relate to the portions of Services terminated; and
- 4) Take such action as may be necessary or as KEPCO E&C may direct to protect and preserve the property related to the Services which is in the Consultant's possession and in which KEPCO E&C has or may acquire an interest.

16.2.2 In the event of a termination under Article 16.2.1 above, the Consultant shall be entitled to payment for both the unpaid Services and any unbilled Services up to the effective date of termination, plus reasonable cancellation fees incurred by the Consultant and Consultant's personnel such as loss on disposal of goods, lease cancellation costs and the airline tickets for repatriation of the Consultant's personnel assigned to Onshore Services and their dependents which are verified and agreed upon by KEPCO E&C as reasonably incurred.

The right of reimbursement for the costs set forth above shall be the Consultant's exclusive remedy for such terminated Services.

16.2.3 In the event of termination of the Services or this Agreement, all portions of the Consultant's Services completed or partially completed as of the date of termination shall become KEPCO E&C's property upon receipt of payments as provided in Article 16.2.2 above and the Consultant shall promptly deliver the same to KEPCO E&C.

## ARTICLE 17 - ASSIGNMENT AND SUBCONTRACT

17.1 Neither this Agreement nor the benefits or obligations under this Agreement shall be sold, assigned or transferred by either party to any third parties including subsidiary or affiliated companies without the prior written approval of the other party, with such approval not to be unreasonably withheld by either.

In the event that approval is given by either party for assignment or transfer, such an approval shall not relieve the either party from any liability and/or responsibility under this Agreement.

- 17.2 Any subcontracts, modifications or terminations thereof relating to the performance of the Services by the Consultant shall not be made without prior written approval by KEPCO E&C.

## ARTICLE 18 - NOTICE

All notices, communications and approvals of major significance to the Agreement, required or permitted to be given hereunder shall be given in writing in English and shall be deemed to have been given, when received, if delivered by one of the following means;

- personal delivery to the designated representative of each of the parties ;
- by registered post ; or
- by email confirmed by registered airmailed letter

the specific designation of the parties as set forth below;

If to KEPCO E&C :

Yoonho Nam

Project Manager

SHN 3&4 Project

KEPCO Engineering & Construction Company, Inc.

269 Hyeoksin-ro, Gimcheon-si, Gyeongsangbuk-do

Republic of Korea

If to the Consultant :

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Either party hereto may change its address by a notice given to the other party in the manner set forth immediately above. Notice given as herein provided shall be considered to have been given upon receipt.

## ARTICLE 19 - SEVERABILITY

In the event that any provisions, portions or applications thereof, is held to be unenforceable or invalid by any court of competent jurisdiction, the validity and enforceability of the remaining provisions, portions or applications thereof shall not be affected thereby.

## ARTICLE 20 - DESIGNATION OF REPRESENTATIVE

Within ten (10) days following the execution of this Agreement or upon a mutually agreed upon date, the Consultant shall nominate a principal representative who shall have authority to act in the name of the Consultant for the purpose of this Agreement and who shall coordinate the Services with the designated representative of KEPCO E&C. KEPCO E&C shall reserve the right to object to and/or request the Consultant to remove or change the principal representative of the Consultant, if, in the opinion of KEPCO E&C, he is incompetent or otherwise unacceptable to KEPCO E&C.

Within ten (10) days following the execution of this Agreement or upon a mutually agreed upon date, KEPCO E&C shall nominate a principal representative who shall have authority to act in the name of KEPCO E&C for the purpose of this Agreement.

## ARTICLE 21 - INVENTIONS

Any and all inventions, discoveries and improvements which any of the Consultant's employees conceive or make, in whole or in part, in the performance of the Services, shall be solely owned by KEPCO E&C, who shall be entitled to patent, at its sole discretion, such inventions, discoveries or improvements in the name of KEPCO E&C. In such a case, however, KEPCO E&C shall grant to the Consultant a full and perpetual, royalty-free, non-transferable license to use such inventions, discoveries and improvements in conducting its business, but only to the furtherance of the purpose of this Agreement. If and when KEPCO E&C elects not to apply for a patent for such improvements or inventions and notifies its decision to the Consultant, the Consultant at its own expense, may be entitled to obtain patents in its own name. In such a case, however, KEPCO E&C shall receive, if KEPCO E&C so requests, a full and perpetual royalty-free, non-transferable license to use such inventions, discoveries and improvements in conducting its business.

## ARTICLE 22 - INFRINGEMENT OF PATENTS

- 22.1 The Consultant hereby warrants that at the time of execution of this Agreement, there is no actual or potential claim, suit, lien or judgment made alleged, brought or obtained by any other predecessor or affiliated entity of the Consultant or by any third party, based on any actual or alleged infringement of any patent, copyright, trade secret or other proprietary right including, without limitation, with respect to the standards or software licensed or purchased hereunder.
- 22.2 In the event of any suit, claim, action or proceeding against KEPCO E&C or its designee arises from allegations that any proprietary rights to be provided by the Consultant under this Agreement, including without limitation, the computer programs, or any portion thereof, constitute infringement of any patent, copy right, trade secret, Know-How, or any other proprietary right of any third party, the Consultant shall defend KEPCO E&C's or its designee's right, title and interest to the same against such suit, claim, action, or proceeding at the Consultant's expense and shall hold KEPCO E&C and its designee harmless from any damages or losses of any kind including, without limitation, legal fees. If as a result of such suit or proceeding, the proprietary rights or any part thereof is held to constitute an infringement and the use of said proprietary rights, or any part thereof, is enjoined, the Consultant promptly shall, at his option and expense, either procure for KEPCO E&C the right to continue using said proprietary rights, or the part thereof, or replace the same with non-infringing proprietary rights acceptable to KEPCO E&C and its designee.
- 22.3 The warranty period of the Consultant's warranty obligations under this Article shall be valid regardless of termination or expiration of this Agreement.

## ARTICLE 23 – CONTRACT PERIOD AND PROJECT COMPLETION SCHEDULE

- 23.1 The Consultant recognizes that the Scheduled Completion Date of Unit 3 is October 31, 2032 and of Unit 4 is October 31, 2033. The parties hereto will perform the Services in order to complete the Services in accordance with the Project Schedule.
- 23.2 The Contract period shall be from the Effective Date of the Agreement to the Scheduled Completion Date of Unit 4.

23.3 However, notwithstanding the foregoing, the Contract period shall be regarded as the period from Effective Date of this Agreement to the expiration date of all rights and responsibilities including the Consultant's warranty, liability, settlement of all tax obligations, and any other obligation under this Agreement.

## ARTICLE 24 - COOPERATION

KEPCO E&C and the Consultant shall establish general policies which shall guide KEPCO E&C and the Consultant in reaching prudent and expeditious decisions with respect to the performance of the Services. Failure to establish such policies shall not in any way release KEPCO E&C from making timely payment to the Consultant in consideration of such performance nor release the Consultant from liabilities to perform its obligations under this Agreement.

KEPCO E&C and the Consultant shall examine documents submitted by each other and take action pertaining thereto promptly, in accordance with such policies, to avoid unreasonable delay in the progress of the work of KEPCO E&C or the Consultant or in KEPCO E&C's payment to the Consultant.

## ARTICLE 25 - ACCEPTANCE OF SERVICES

In the event KEPCO E&C considers that Consultant's services are no longer required, KEPCO E&C shall give notice to the Consultant and the Consultant shall give KEPCO E&C an appropriate technical and accounting report within one (1) month after receipt of KEPCO E&C's notice. KEPCO E&C shall, within one (1) month thereafter, accept those Services in writing or give the Consultant written notice of any item of unfinished work or deficiencies to be corrected. The Consultant shall perform or correct the unfinished work or deficiencies and shall notify KEPCO E&C in writing when all such items of unfinished work or deficiencies have been corrected and KEPCO E&C shall give the Consultant written notice of acceptance within one (1) month thereafter if such correction is completed in the opinion of KEPCO E&C. If KEPCO E&C fails to give notice of acceptance in the manner and at the times provided above, the Services shall be deemed to have been accepted by KEPCO E&C for all purposes of this Agreement. The acceptance of the Services by KEPCO E&C shall in no event be considered a release of the Consultant's responsibilities, except as specifically provided elsewhere in this Agreement.

## ARTICLE 26 - PERFORMANCE BOND

As a security for satisfactory performance of its obligation under this Agreement, the Consultant shall provide KEPCO E&C with an unconditional Performance Bond in a form of a bank guarantee in favor of KEPCO E&C, issued by a bank acceptable to KEPCO E&C, in the amount of ten percent (10%) of the Agreement Amount shown in Article 4 from the Effective Date of this Agreement until thirty (30) days after the Acceptance of Services set forth in Article 25. The guarantee amount (10 % of the Agreement Amount) shall be forfeited to KEPCO E&C and not be returned to the Consultant, in case of the Consultant's material breach of the Contract.

## ARTICLE 27 - APPROVAL

Documents or drawings to be prepared by the Consultant under this Agreement shall be subject to the approval of KEPCO E&C which shall not be unreasonably withheld. However, the fact that any document or drawing has been approved by KEPCO E&C shall not relieve the Consultant from his responsibility under this Agreement.

## ARTICLE 28 - RESPONSIBILITIES OF THE PARTIES

### 28.1 KEPCO E&C's Responsibilities

28.1.1 Except for information which is proprietary or confidential to KEPCO E&C, KEPCO E&C shall provide the Consultant with available data (including the data provided by any foreign equipment suppliers), criteria and other necessary information to the Consultant in a reasonably expeditious manner for the Consultant to perform the Services.

28.1.2 KEPCO E&C shall assist the Consultant with reasonable efforts in obtaining entry visas and related documents for the Consultant's personnel, if requested by the Consultant.

28.1.3 KEPCO E&C shall provide, in a timely manner, reasonable office facilities and other items as shown in Appendix E, "Support Services and Facilities," for the Consultant's personnel to be assigned to the Services. Such facilities shall be of similar standards as those of KEPCO E&C employees, as the case may be, of a similar grade.

## 28.2 The Consultant's Responsibilities

- 28.2.1 The Consultant shall obtain all necessary customary local licenses, permits, authorizations, customs clearances and handling, and agreements required for the Consultant to do business in the jurisdiction in which the Services are performed. KEPCO E&C will reasonably assist the Consultant, at the request of Consultant, in obtaining such necessary local licenses, permits, authorizations and agreements.
- 28.2.2 KEPCO E&C does not envision assignment of its personnel to the Consultant's Offshore office for long or short term assignment. In the event that such a long or short term assignment is necessary, the parties shall agree on terms of compensation for necessary support facilities.  
However, support facilities for KEPCO E&C or KHNP personnel during short business trips shall be provided by the Consultant at no extra cost.
- 28.2.3 The Consultant, its employees and agents, shall comply with all legal provisions, regulations and safety rules for work applicable to the territories in which the Services are carried out.
- 28.2.4 Except as provided in Article 9.2, the Consultant shall pay all fees, fines and penalties and take all other actions under legal provisions and regulations applicable to the Consultant at the Consultant's sole expense.
- 28.2.5 The Consultant shall be responsible for all licenses, permits, customs clearance, handling procedures and expenses including manpower and insurance (except for customs duties, tariffs or taxes to be reimbursed as set forth in Article 9.2) related to the delivery and installation of Business Effects and to the delivery of outputs of Services.
- 28.2.6 The Consultant shall exercise reasonable care in the use of the facilities, materials, furniture and equipment provided by KEPCO E&C under this Agreement and return all nonconsumables to KEPCO E&C, as the case may be, upon completion of the use thereof or completion of the Project, whichever occurs first.



## ARTICLE 29 - LANGUAGE AND UNITS

The text of Agreement, technical specifications or documents shall be made in English unless otherwise requested by KEPCO E&C. Measurement units shall be metric except where use of FT-LB is justified as highly practical. The engineering process will be carried out in the FT-LB system. Selected engineering products such as start-up manual, operating instruction manuals, and licensing documents shall use the metric system. For local procurement, the metric system will be used in principle, unless use of the FT-LB system is practical. In cases where a definite transition stage is not feasible due to interactive engineering, dual units may be used. The scales and ranges of instrumentation shall be in the metric system. The name plates of equipment and components shall use the metric system but dual units may be used if necessary.

## ARTICLE 30 - ASSIGNMENT AND TERMINATION OF THE CONSULTANT PERSONNEL

### 30.1 General

As more fully specified in Article 11, "Warranty and Liability," the Consultant shall perform its Services in an orderly and workmanlike manner to meet the high standard of generally accepted engineering practices observed for similar projects and shall not employ any unfit person or anyone unskilled in the work assigned to the Consultant.

### 30.2 Personnel for Onshore Assignment

#### 30.2.1 New Assignment

The Consultant shall submit to KEPCO E&C the personal data including qualifications and experience of each candidate for participation in the Project within fifteen (15) days of KEPCO E&C 's written request in accordance with Article 3, "Method of Performance and Work Procedure," and KEPCO E&C 's instructions. KEPCO E&C shall have the right to interview the Consultant's personnel in the Consultant's home office or at any place as convenient to the Consultant prior to their assignment Onshore. KEPCO E&C through its designated representative, shall have the final authority to approve or disapprove the candidates recommended by the Consultant. KEPCO E&C will notify the Consultant whether the candidate is accepted or not within

fifteen (15) days of receipt of the personal data. If the candidate is rejected, the Consultant shall submit personal data document of another candidate within fifteen (15) days. If the second candidate is again rejected, a third and final candidate shall be processed in the similar procedure and time frame.

If the third candidate is again rejected, KEPCO E&C shall contact a third company other than the Consultant to secure a properly qualified person and for such diversion the Consultant shall not be authorized to file any complaints against KEPCO E&C. In such case, the Agreement Manhours and Amount shall be adjusted in accordance with Article 7, "Revisions."

KEPCO E&C shall provide formal written notification of assignment authorization of the personnel to the Consultant no later than forty-five (45) days in advance of each assignment start date.

### 30.2.2 Termination or Relocation

If the Consultant wants to relocate or dismiss any of its personnel, the Consultant shall consult with the Principal Designated Representative of KEPCO E&C prior to any relocation or termination of the Consultant's personnel. KEPCO E&C shall have the final decision-making authority regarding any such relocation or termination.

KEPCO E&C shall have the right to periodically, or at any time, evaluate the qualification, performance and/or the productivity of the Consultant's personnel.

KEPCO E&C shall develop reasonable written criteria to use in KEPCO E&C's said evaluation of the Consultant's personnel. KEPCO E&C shall have the right to request dismissal or replacement of personnel who turn out to be unqualified or unsuitable for the Project when evaluated against such evaluation criteria. The written evaluation criteria and changes thereto shall be provided to the Consultant prior to any KEPCO E&C request for dismissal.

In the event of any dismissal or replacement requested by KEPCO E&C, the Consultant shall promptly dismiss the unqualified person, and if KEPCO E&C decides a replacement is needed, the consultant shall provide KEPCO E&C with a resume of other qualified personnel, at its own expense, within thirty (30) days after such replacement request.

Approval of the replacement candidate shall follow the same procedure that is applied to New Assignment (Article 30.2.1). In such instances, the return expenses of the

replaced assignees and the assignment expenses of the replacing assignees shall be to the Consultant's account.

Replacements due to employees' voluntary terminations, the Consultants' requested transfers, retirements prior to assignment completion, and medical terminations shall also be at the Consultant's own expense. However, the airline tickets for the repatriation plus reasonable cancellation fees incurred by the Consultant's personnel such as loss on disposal of goods and lease cancellation costs resulting from staffed position elimination by KEPCO E&C's unilateral decision shall be reimbursed.

- 30.2.3 Notwithstanding KEPCO E&C's rights regarding the appointment, relocation or termination of any of the Consultant's personnel, the Consultant shall at all times retain full and unseverable responsibility for the due performance of its obligations hereunder and for the satisfactory completion of the Services.

## ARTICLE 31 - WORKING HOURS AND HOLIDAYS

### 31.1 Onshore Services

- 31.1.1 Regular working hours and days for the consultant will be consistent with KEPCO E&C employees, standard working hours. Regular working hours and days per week may be adjusted by KEPCO E&C's internal policy. Further detail information on working hours per week shall be determined by KEPCO E&C and notification thereof will be given to the Consultant.

#### 31.1.2 Home Leave

Consultant personnel and their families (a spouse and children below 19 years old for long-term assignment only) shall be qualified for one home leave travel for each twelve (12) months provided that remaining assignment is longer than six (6) months.

### 31.2 Offshore Services

Regular working days shall consist of eight (8) working hours (excluding lunch time) from Monday through Friday. Regular working hours per week are forty (40) hours. Actual working hours and days per week may be adjusted by the Consultant's internal policy. The Consultant shall notify KEPCO E&C of any changes in said internal policy within thirty (30) days after implementing the change.

- 31.3 If overtime work beyond the regular working hours set forth in Articles 31.1 and 31.2 above becomes necessary for effective and timely performance of the Consultant's Services, KEPCO E&C shall have right to reasonably request the Consultant to work overtime and the Consultant shall comply with the request of KEPCO E&C. Onshore overtime work shall be subject to prior approval by KEPCO E&C. However, overtime premium shall not be reimbursed in any case.
- 31.4 Time records for all hours worked by the Consultant's personnel shall be approved as described in Article 4.2.1.2) and copies of such approved records shall be attached to the Consultant's invoice. Any compensation for working hours derived from time records not signed as required by Article 4.2.1.2) shall not be paid.

## ARTICLE 32 - CODES, STANDARDS, REGULATIONS, AND REGULATORY GUIDES

- 32.1 The Korea Electric Power Industry Code ("KEPIC"), 2005 edition through 2021 addenda shall be applied to this Agreement. All other Codes and Standards than KEPIC shall be the edition in effect as of December 31, 2021, unless indicated otherwise. In the event that the applicable Codes, Standards, Rules and Regulations of the United States of America conflict with those of Korea, the reference codes and standards takes precedence over KEPIC.
- 32.2 The determination of the applicability and the interpretation of the Codes, Standards, and Korea Nuclear Rules and Regulations shall be made by KEPCO E&C, including the choice between conflicting Codes and Standards.
- The Consultant shall advise KEPCO E&C of any detrimental effects that may occur as a result of such determination of applicability and interpretation, and KEPCO E&C shall evaluate such advice before implementation.
- 32.3 In the event that requirements of Codes, Standards, Regulations of the United States of America or Korea Nuclear Rules and Regulations referred to in Article 32.1 above are changed after effective date hereof, the Consultant shall promptly advise KEPCO E&C of the changes, if any, to the commercial terms or other conditions of the Agreement.
- KEPCO E&C and the Consultant shall agree upon the number of the additional manhours or reduced manhours required to reflect the effect of the changes in Codes,

Standards, Regulations and Regulatory Guides.

The Agreement Manhours and Agreement Amount of the Consultant's Services shall be adjusted in accordance with Article 7, "Revisions."

## ARTICLE 33 - ENTIRE AGREEMENT

This Agreement constitutes the entire agreement and understanding between the parties as to the subject matter of this Agreement and this Agreement merges and supersedes all previous discussions, agreements and understanding of any and every nature between them. This Agreement shall not be amended except by written agreement of the parties.

## ARTICLE 34 - SECURITY

- 34.1 Subject to the requirements of Article 12, "License and Ownership of Data and Proprietary Information," the Consultant agrees not to communicate or disclose any information obtained in connection with the performance of the Services covered by this Agreement or other information acquired during the course of the performance of the Services to third parties, unless a written permission of KEPCO E&C is first obtained, and also agrees to take appropriate measures to have its employees keep secret such information.
- 34.2 During the performance of the Services, the Consultant shall make all reasonable efforts to safeguard all documents, information and other materials against burglary, theft or industrial espionage during and after normal working hours.
- 34.3 The Consultant shall use its commercially reasonable efforts and give the highest priority to assign only those personnel who will conduct themselves in their performance of the Services under this Agreement using the high standards of moral, legal and ethical conduct to which KEPCO E&C subscribes.

## ARTICLE 35 – TRAINING SERVICES FOR KHNP PERSONNEL

The Consultant shall provide training services for KHNP personnel. The contract terms and

conditions for the training services shall be in accordance with Appendix G, "Training for KHNP Personnel."

## ARTICLE 36 – LIQUIDATED DAMAGES

The Consultant warrants that it shall furnish its engineering deliverables review report or production services output in accordance with the mutually agreed dates set forth in each Work Order. In the event that the Consultant fails to furnish the deliverables as of the agreed date, for causes solely attributable to the Consultant and the delay causes any damages or losses to KEPCO E&C the Consultant shall pay to KEPCO E&C a liquidated damage therefrom. The daily amount of such liquidated damage shall be zero point one two five percent (0.125%) of the total amount of the corresponding Work Order per day of delay. The total liquidated damages shall be limited to ten percent (10%) of the corresponding Work Order amount.

If the Consultant has reason to believe that a deliverable item will not be delivered on time, it has an obligation to so inform KEPCO E&C in writing stating the cause of the potential delay and what measures should be taken. The giving of such notice shall not be reason for relief from the above liquidated damage.

The submittal of the engineering deliverables will be considered complete if the deliverable items are issued by the Consultant to KEPCO E&C and signed off by KEPCO E&C in accordance with the standard procedure adopted for the Project. For deliverable items which are comprised of more than one item, the submittal shall be considered complete when the last individual item has been submitted.

## ARTICLE 37 - CONTRACTUAL INTEGRITY

- 37.1 The Consultant shall not offer or grant any bribes or undue benefits, including money, other articles, or treats, either directly or indirectly to any officials concerned, in the process of bid, award of contract, execution or performance of contract.
- 37.2 The Consultant shall not engage in any unfair practices that unreasonably undermine fair competition in a bid, such as bid-rigging or collusion to render the award of contract to a particular participant.
- 37.3 In the event of any violation above, KEPCO E&C shall be entitled to:

- 1) terminate any contract with the Consultant including this contract; and/or
- 2) prohibit the Consultant from participating in any bids invited by KEPCO E&C for the period of two(2) years, and the Consultant shall not raise any objections or file any civil or criminal claims against KEPCO E&C for any measures taken by KEPCO E&C.

37.4 The Consultant shall be deemed to have signed and accepted the Integrity Pact attached hereto by signing this contract.

## ARTICLE 38 - EFFECTIVENESS

This Agreement shall be entered into full force and effect upon the formalities provided below being fulfilled:

- The signing of this Agreement by the parties hereto

## **2. PRICE BID FORMAT**

Please refer to Appendix F "Formats for Bid" for detailed formats:

Format # 1-1 Total Estimated Bid Amount

Format # 1-2 Bidder's Actual Base Salaries and Estimated Manhours

Format # 1-3 Overhead and Fee

Format # 1-4 Other Direct Costs

Format # 1-5 Training cost for KHNP peronnel

Format # 2 Salary Grade and Rates

Format # 3 Biodata Form



### 3. DEVIATION REQUEST FORMAT

Article #	DESCRIPTION	JUSTIFICATION

## 4. PERFORMANCE GUARANTEE REQUIREMENTS

Consultant shall furnish KEPCO E&C with a Performance Guarantee which shall be of Bank Guarantee or Standby Letters of Credit (LC). Guarantee shall be issued by KEB Hana Bank KEPCO E&C(S) branch.

All costs, expenses, fees and charges levied by all banks party to the Performance Guarantee shall be prepaid/borne by the Consultant. The Performance Guarantee shall contain all requirements of payment to KEPCO E&C.

Requirements of the Performance Guarantee:

- Designated bank information:
  - KEB Hana Bank (KEPCO E&C(S) Branch)
  - Swift Code: KOEXKRSE or KOEXKRSEXXX
  - Bank Address: 269, Hyeoksin-Ro, Gimcheon-Si, Gyeongbuk-Do, 39660, Republic of Korea
  - Tel.: +82-54-437-9405
- Application Rules: UCP Latest Version
- Guarantee period: Guarantee period described in the Contract
- Guarantee Amount: 10% of the Contract Price
- Beneficiary: KEPCO Engineering & Construction Co., Inc.  
269, Hyeoksin-Ro, Gimcheon-Si, Gyeongbuk-Do, 39660, Republic of Korea
- The Performance Guarantee shall be denominated in the currency used in the Contract.
- It shall be the responsibility of the Consultant to ensure that its Performance Guarantee is valid at all times during the period of contract validity and further is in the full amount as contracted.
- The performance guarantee shall be held against payment to KEPCO E&C for any loss resulting from the Consultant's failure to perform its contractual obligations fully and properly without any reference to the Consultant.
- The performance guarantee shall be irrevocable shall be provided in as a first-demand guarantee.
- Bank shall use the wordings for guarantee as below.

[Wordings for Guarantee]

## 1. Bank Guarantee by KEB Hana Bank

APPLICANT: [To be Included]

BENEFICIARY: KEPCO ENGINEERING AND CONSTRUCTION CO., INC.  
269, HYEOKSIN-RO, GIMCHEON-SI  
GYEONGSANBUK-DO 39660, REPUBLIC OF KOREA

WE HAVE BEEN INFORMED BY OUR PRINCIPAL, [To be Included], CONCLUDED A CONTRACT THAT YOU HAVE SIGNED WITH THEM THE CONTRACT FOR [To be Included] WITH KEPCO ENGINEERING AND CONSTRUCTION CO., INC. (HEREINAFTER REFERRED TO AS THE BENEFICIARY) FOR [Contract amount to be Included] TO PROVIDE CONSULTING SERVICE.

WE HAVE ALSO BEEN INFORMED THAT ACCORDING TO THE ABOVE-MENTIONED CONTRACT, A PERFORMANCE GUARANTEE IS REQUIRED.

AT THE REQUEST OF THE PRINCIPAL, WE, KEB HANA BANK, 35 ULCHIRO, CHUNG-GU, SEOUL, REPUBLIC OF KOREA, HEREBY IRREVOCABLY UNDERTAKE TO PAY YOU ANY SUM OF SUMS NOT EXCEEDING IN TOTAL AN AMOUNT OF [To be Included] UPON RECEIPT BY US OF YOUR FIRST DEMAND IN WRITING AND YOUR WRITTEN STATEMENT STATING THAT THE PRINCIPAL IS IN BREACH OF HIS OBLIGATIONS UNDER THE UNDERLYING CONTRACT AND THE RESPECT IN WHICH THE PRINCIPAL IS IN BREACH.

THIS GUARANTEE WILL EXPIRE ON [To be Included], AT THE LATEST. CONSEQUENTLY, ANY DEMAND FOR PAYMENT MUST BE RECEIVED BY US AT THIS OFFICE ON OR BEFORE THAT DATE.

THIS GUARANTEE IS SUBJECT TO THE UNIFORM RULES FOR DEMAND GUARANTEES, ICC PUBLICATION NO.758.

## 2. Counter Guarantee by other bank and guaranteed by KEB Hana Bank

TO: KEB HANA BANK (KEPCO E&C(S) Branch)  
Swift Code: KOEXKRSE or KOEXKRSEXXX  
Bank Address: 269, Hyeoksin-Ro, Gimcheon-Si, Gyeongbuk-Do, 39660, Republic of Korea

AT THE REQUEST OF PRINCIPAL, PLEASE ISSUE ON OUR RESPONSIBILITY IN FAVOR OF KEPCO ENGINEERING AND CONSTRUCTION CO., INC. YOUR GUARANTEE IN THE FOLLOWING WORDING:

QUOTE

APPLICANT: [To be Included]

BENEFICIARY: KEPCO ENGINEERING AND CONSTRUCTION CO., INC.  
269, HYEOKSIN-RO, GIMCHEON-SI  
GYEONGSANBUK-DO 39660, REPUBLIC OF KOREA

WE HAVE BEEN INFORMED BY OUR PRINCIPAL, [To be Included], CONCLUDED A CONTRACT THAT YOU HAVE SIGNED WITH THEM THE CONTRACT FOR [To be Included] WITH KEPCO ENGINEERING AND CONSTRUCTION CO., INC. (HEREINAFTER REFERRED TO AS THE BENEFICIARY) FOR [Contract amount to be Included] TO PROVIDE CONSULTING SERVICE.

WE HAVE ALSO BEEN INFORMED THAT ACCORDING TO THE ABOVE-MENTIONED CONTRACT, A PERFORMANCE GUARANTEE IS REQUIRED.

AT THE REQUEST OF THE PRINCIPAL, WE, KEB HANA BANK, 35 ULCHIRO, CHUNG-GU, SEOUL, REPUBLIC OF KOREA, HEREBY IRREVOCABLY UNDERTAKE TO PAY YOU ANY SUM OF SUMS NOT EXCEEDING IN TOTAL AN AMOUNT OF [To be Included] UPON RECEIPT BY US OF YOUR FIRST DEMAND IN WRITING AND YOUR WRITTEN STATEMENT STATING THAT THE PRINCIPAL IS IN BREACH OF HIS OBLIGATIONS UNDER

THE UNDERLYING CONTRACT AND THE RESPECT IN WHICH THE PRINCIPAL IS IN BREACH.

THIS GUARANTEE WILL EXPIRE ON [To be Included], AT THE LATEST. CONSEQUENTLY, ANY DEMAND FOR PAYMENT MUST BE RECEIVED BY US AT THIS OFFICE ON OR BEFORE THAT DATE.

THIS GUARANTEE IS SUBJECT TO THE UNIFORM RULES FOR DEMAND GUARANTEES, ICC PUBLICATION NO.758.

UNQUOTE

IN CONSIDERATION OF YOUR ISSUING YOUR GUARANTEE AS ABOVE, WE, [To be Included], HEREBY GIVE YOU OUR IRREVOCABLE COUNTER-GUARANTEE AND UNDERTAKE TO PAY YOU ANY SUM OR SUMS NOT EXCEEDING IN TOTAL AMOUNT OF [To be Included] UPON RECEIPT BY US AT THIS OFFICE NO LATER THAN [To be Included] OF YOUR FIRST WRITTEN DEMAND. SUCH A DEMAND SHALL BE SUPPORTED BY YOUR WRITTEN STATEMENT THAT YOU HAVE RECEIVED A DEMAND FOR PAYMENT UNDER YOUR GUARANTEE IN ACCORDANCE WITH ITS TERMS AND WITH ARTICLE 18 OF THE UNIFORM RULES FOR DEMAND GUARANTEES.

THIS COUNTER-GUARANTEE IS SUBJECT TO THE UNIFORM RULES FOR DEMAND GUARANTEES, ICC PUBLICATION NO. 758.

PLEASE CONFIRM TO US THE ISSUANCE OF YOUR GUARANTEE.

CHARGES: ALL BANKING CHARGES SHALL BE FOR THE ACCOUNT OF THE APPLICANT.

## 5. Certification of Matters relating to Restrictions on Conclusion of Negotiated Contracts

• Mark  in [ ] where applicable.

Employer	Name KEPCO Engineering & Construction Co., Inc. (KEPCO E&C)	Department	Date
	Procurement Item [ ] Construction Service [ ] Other Service [ ] Goods [ ] Other		

Prospective Consultant (Representative)	Name	Position	[ ] Individual [ ] Corporation [ ] Organization [ ] Other
	Phone: E-mail:	Address	

### Matters for Verification

1	<p>Are any of the Prospective Consultant's employees or the Prospective Consultant any of the following?</p> <ul style="list-style-type: none"> <li>- A high-ranking public servant belonging to the Employer</li> <li>- The spouse of the public servant above</li> <li>- A lineal ascendant or lineal descendant of the public servant above</li> <li>- A lineal ascendant or lineal descendant of the spouse of the public servant above (only if the ascendant or descendant lives together with the public servant)</li> </ul>	<p>[ ] Yes [ ] No [ ] N/A</p>
2	<p>Are any of the Prospective Consultant's employees or the Prospective Consultant any of the following?</p> <ul style="list-style-type: none"> <li>- A public servant in charge of duties related to the relevant contract effectively and legally</li> <li>- The spouse of the public servant above</li> </ul>	<p>[ ] Yes [ ] No [ ] N/A</p>

	<ul style="list-style-type: none"> <li>- A lineal ascendant or lineal descendant of the public servant above</li> <li>- A lineal ascendant or lineal descendant of the spouse of the public servant above (only if the ascendant or descendant lives together with the public servant)</li> </ul>	
3	<p>Are any of the Prospective Consultant's employees or the Prospective Consultant any of the following?</p> <ul style="list-style-type: none"> <li>- A high-ranking public servant belonging to the institution which supervises the Employer (i.e., relevant affiliated public institution)</li> <li>- The spouse of the public servant above</li> <li>- A lineal ascendant or lineal descendant of the public servant above</li> <li>- A lineal ascendant or lineal descendant of the spouse of the public servant above (only if the ascendant or descendant lives together with the public servant)</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4	<p>Are any of the Prospective Consultant's employees or the Prospective Consultant any of the following?</p> <ul style="list-style-type: none"> <li>- A high-ranking public servant belonging to the public institution which is the parent company of the Employer (i.e., relevant subsidiary company)</li> <li>- The spouse of the public servant above</li> <li>- A lineal ascendant or lineal descendant of the public servant above</li> <li>- A lineal ascendant or lineal descendant of the spouse of the public servant above (only if the ascendant or descendant lives together with the public servant)</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5	<p>Are any of the Prospective Consultant's employees or the Prospective Consultant any of the following?</p> <ul style="list-style-type: none"> <li>- A member of the National Assembly who serves as a member of a Standing Committee overseeing the Employer</li> <li>- The spouse of the member of the National Assembly above</li> <li>- A lineal ascendant or lineal descendant of the member of</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

	<p>the National Assembly above</p> <ul style="list-style-type: none"> <li>- A lineal ascendant or lineal descendant of the spouse of the member of the National Assembly above (only if the ascendant or descendant lives together with the member of the National Assembly)</li> </ul>	
6	<p>Are any of the Prospective Consultant's employees or the Prospective Consultant any of the following?</p> <ul style="list-style-type: none"> <li>- A local council member who audits and inspects or investigates the Employer</li> <li>- The spouse of the local council member above</li> <li>- A lineal ascendant or lineal descendant of the local council member above</li> <li>- A lineal ascendant or lineal descendant of the spouse of the local council member above (only if the ascendant or descendant lives together with the local council member)</li> </ul>	<p>[ ] Yes [ ] No [ ] N/A</p>
7	<p>In case any of the matters in No. 1 ~ 6 above is/are answered as yes, is the Prospective Consultant a corporation or an organization which employs as an executive officer such person(s) falling thereunder?</p>	<p>[ ] Yes [ ] No [ ] N/A</p>
8	<p>In case any of the matters in No. 1 ~ 6 above is/are answered as yes, is the Prospective Consultant a specially related business entity with respect to such person(s) falling thereunder?</p> <p>* Specially related business entity: In case the prospective consultant is a corporation or an organization, whose (1) at least 30/100 of the total number of issued stocks, (2) at least 30/100 of the total number of equity interests, or (3) at least 50/100 of the total capital, are solely or jointly owned by such person(s) himself or herself, or his or her spouse, lineal ascendant, or lineal descendant – including lineal ascendant or descendant of the spouse of such person(s) where the ascendant or descendant lives together with such persons(s).</p>	<p>[ ] Yes [ ] No [ ] N/A</p>

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Certification/Confirmation

I/we hereby certify/confirm the information in relation to Article 12 of the Act on the Prevention of Conflict of Interest Related to Duties of Public Servants as provided above. I/we pledge to be subject to any penalties or liabilities under law if any of the information provided above is not true and correct.

[Name of	Name:	YYYY/MM/DD
Prospective Consultant]	Position:	(Signature)

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# **CHAPTER IV**

## **TECHNICAL INFORMATION**

- 1. KEPCO E&C'S SCOPE OF SERVICES TO KHNP**
- 2. CONSULTANT'S SCOPE OF SERVICES TO KEPCO E&C**
- 3. METHOD OF PROJECT IMPLEMENTATION**

# 1. KEPCO E&C's Scope of Services to KHNP

## 1.1 Services Involved

The scope of the Architect Engineering (A/E) services for the SHN 3&4 includes Engineering and Engineering Management, Project Management assistant for KHNP, and Owner support.

The services are divided into two categories - "A/E Unique Services (AEUS)" which include Engineering and Engineering Management, and "Owner Support Services (OSS)."

### (1) Engineering and Engineering Management Services

Engineering and engineering management services include the following services:

#### A. Design and engineering services for the following categories of work:

- Design and engineering of plant buildings, structures and the systems included therein
- Licensing support
- Engineering support for procurement
- Engineering support for construction and start-up
- Interface coordination with NSSS and T/G

#### B. Engineering management services for the following categories of work:

- Management, planning, and scheduling of the design and engineering work (including preparation and use of Engineering Procedures Manual)
- Administration of the design and engineering work (including setting up and operating a KEPCO E&C Design Document Control Center)
- Quality assurance and quality engineering
- Engineering cost estimating and control
- Engineering support for material control

### (2) Owner Support Services

Owner support services are performed by providing technically competent personnel, on an as-requested basis, for the services under KHNP's responsibilities including licensing, construction, and start-up supports at site.

## 1.2 Plant Buildings, Structures, and Systems

The Services cover the following plant buildings, structures, and systems included therein:

- A. Power block buildings and structures (excluding NSSS and T/G systems and equipment)
  - Reactor Containment Building
  - Auxiliary Building including Main Control Room
  - Compound Building
  - Turbine Generator Building
- B. Ancillary Buildings and Structures
  - Component Cooling Water Heat Exchanger Building
  - Fire Pump & Water/Wastewater Treatment Building
  - Circulating Water Intake Structure
  - Cold Machine Shop
  - Seismic Category I AAC Diesel Generator Building
  - Yard Underground Tunnels and Facilities
  - Yard Storage Tanks (process water, oil, chemical)
  - Chlorination Building
  - Essential Service Water Intake Structure
  - N<sub>2</sub> & H<sub>2</sub> Gas Storage
  - Miscellaneous Yard Structures
- C. Miscellaneous Facilities
  - Fences and Gates

## 1.3 Typical Design and Engineering Activities

Typical design and engineering work include conceptual, preliminary, and detailed engineering, and design work as outlined below:

- Plan, organize, sequence and schedule the design and engineering activities
  - Prepare site plot plan
  - Prepare general arrangement
  - Prepare unit power block general arrangement and equipment location drawings
  - Develop basic and detail designs for buildings, systems, equipment, and yard facilities

- o Prepare report for various underwater hazard prediction and protection method for the underwater structures
- o Prepare detailed design for building foundations and equipment support including inserts and embedments
- o Prepare technical specifications for procurement of equipment and materials, including, but not limited to, the material list and quantity, required delivery date, and requirements for spare parts, special tools and consumables
- o Prepare construction contract packages, including, but not limited to, construction technical specifications, estimated material list and quantities to be installed and specifications for constructor supplied material for bidding purpose
- o Prepare process functional diagrams, and piping and instrument diagrams
- o Prepare area piping drawings
- o Develop electrical single line diagrams, elementary wiring diagrams and control logic diagrams
- o Design auxiliary system power and control circuits and prepare electrical schematic diagrams for the circuits with details for power distribution, controls and alarms
- o Design outdoor switchyard including jumper lines for gantry tower of 345 kV transmission lines
- o Prepare electrical drawings indicating location, elevation, and support of electrical equipment, and showing routing of cable tray, conduit, bus duct, and grounding network
- o Design severe accident analysis and mitigation design to meet the severe accident requirements of 10 CFR 50.34(f), SECY-93-087 and KURD (Korean Utility Requirements Document), etc.
  - Hydrogen control system design and analysis
  - Reactor cavity and internal structure design to prevent and mitigate High Pressure Melt Ejection (HPME) and Direct Containment Heating (DCH)
  - Reactor cavity flooding system design to mitigate Molten Core Concrete Interaction (MCCI) and maintain long-term debris coolability
  - Containment performance analysis and structural design considering AICC load, DCH load, containment overpressure load and steam explosion load
  - Equipment survivability in severe accident environments
- o Prepare control logic and instrumentation diagrams for the fully digitalized monitoring and control systems with improved functionalities compared with conventional system
- o Design Man-Machine Interface (MMI) applying digital technology and Human

- Factors Engineering (HFE) program based on current licensing requirement.
- Compact workstation-type advanced MMI
  - Large Display Panel (LDP) providing plant overview status
  - Information display providing detailed plant status and control interface
  - Soft control using computer display
  - Standardized MMI design throughout NSSS, T/G and BOP
  - HFE verification & validation
- o Prepare drawings and specifications for the operation consoles in the main control room and for local control boards, panels and instrument racks
  - o Prepare necessary data, drawings, and description to define building access criteria
  - o Perform necessary studies and prepare reports to define design requirements
  - o Perform the seismic design for the buildings and structures
  - o Incorporate required final as-built changes
  - o Prepare a shielding report
  - o Establish radiation zones, accessibility and maintenance requirements
  - o Perform analysis for the pipe whip impact and blowdown jet impingement forces
  - o Perform analysis for the missile generation and impact
  - o Prepare detail design for pipe whip restraint in reactor containment building and other areas in the plant
  - o Perform stress analysis for piping
  - o Support of welding, NDE, metallurgy, coating and corrosion process control
  - o Perform reliability engineering program
  - o Prepare detail drawings for rebar (reinforcement bar)
  - o Prepare detail drawings for hangers and supports
  - o Design and review data communication system
  - o Prepare hot machine shop equipment layout
  - o Detail HVAC ductwork and supports
  - o Prepare raw water supply system design including branch connections to the existing raw water main piping
  - o Prepare detailed lighting drawings including fixture location and circuits
  - o Review design document for compliance with engineering procedural requirements, and other quality related work
  - o Prepare the main control room layout
  - o Provide resident engineering services at the site
  - o Coordinate technical interfaces with NSSS and T/G
  - o Evaluate the impacts of design changes from various sources such as A/E, NSSS, T/G, and BOP vendors

- o Cyber Security Program (including policy, plan and implementation)
- o Perform the aircraft impact assessment (AIA)

## 2. Consultant's Scope of Services to KEPCO E&C

### 2.1 General

Consultant shall provide KEPCO E&C with consulting services including direct production of the project deliverables (drawings, calculations, specifications, etc.), which will be part of the services that KEPCO E&C will provide to KHNP.

Details of work breakdown by engineering discipline and magnitude of the work in the form of manhour are given in Appendix D. The information and MH, however, are KEPCO E&C's estimates only. The Consultant shall propose a manning plan based on its judgment on the KEPCO E&C's need of technical supports from the consultant taking into consideration of the descriptions of required services provided in Appendix C and Appendix D. Further instructions regarding the preparation of manning plan are provided in Chapter II .

It is foreseen that most Consultants will work at KEPCO E&C home office but some consultants may be dispatched to jobsite (Shin-Kori). Actual manpower assignment (the time of dispatch, the duration of dispatch, the scope of services, grade, etc.) shall be made on an "as KEPCO E&C's requested basis." The dispatched consultants shall perform the consulting services according to KEPCO E&C's instructions.

The KEPCO E&C home office is located at 269 Hyeoksin-ro, Gimcheon-si, Gyeongsangbuk-do (Approximately 220 km apart from south of Seoul)

### 2.2 Supply of Design Technologies

KEPCO E&C intends to be technically self-reliant in all areas of nuclear power plant design. To achieve that goal, KEPCO E&C is vitally interested in the transfer of design technologies in areas of the most recent advances. Therefore, as an optional Bid item, the Consultant may propose a separate technology transfer package aimed at technical self-reliance.

The design technologies of interest will include, but not limited to, the following:

- o Guidelines, study report, and/or standard for the design of minimization of contamination, decontamination and decommissioning.
- o Guidelines, study reports, and/or analysis program for the design of safety-related HVAC ductwork and seismic soil-structure interaction analysis in accordance with new regulatory requirements.
- o Guidelines, study reports, and/or standards for the design, fabrication and erection of Complex Modules that include allowable tolerances.
- o Guidelines, study reports, and/or recommendations for piping stress analyses that include specific methodologies acceptable by industry and regulations for welded attachments on elbows, thermal stratification, and fatigue analysis with the environmental effects, etc.
- o Other guidelines, study reports, analyses, specifications, computer programs, etc. which the Consultant are the state-of-the-art in nuclear power plant design may be offered as an enhancement to the Bid.

<b>Program Title</b>	<b>Program Usage</b>	<b>Remarks</b>

For each design technology to be supplied, a full description shall be provided, including title, area of usage, purpose, applicability, list of documents to be provided, methodology required for technology transfer, any limitations for usage, and pricing information.

## 2.3 Type of Services

The Consultant's Services shall be mainly to provide consulting services to KEPCO E&C, with KEPCO E&C having overall responsibility for the architect engineer services for the SHN 3&4 Project. The Consultant's Services shall comprise four categories: a) Advisory Services; b) Packaged Review Services; c) Packaged Production Services; and d) Non-Packaged Production Services.

For Packaged Production and Packaged Review Services, written requests shall be given to either the Consultant's Advisor-to-APM or OTS Coordinator by KEPCO E&C.

### 2.3.1 Advisory Services

The Advisory Services shall include providing advice, consultation and assistance to the assigned KEPCO E&C counterparts, and other related tasks such as overview of technical documents for adequacy and integrity, attendance at meetings, and interface coordination with external entities.

The Advisory Services shall also include consultation and advice in the areas of technical approach, schedule commitments, and interface requirements.

The Advisory Services shall primarily come from Consultant's personnel assigned to Onshore tasks. Advisory Services may sometimes be sought from other members or part of organizations of Consultant other than the above mentioned permanently assigned Onshore personnel.

Advisory Services include not only policy making, managerial issues but also working level assistance.

### 2.3.2 Packaged Review Services

If Consultant is requested to review certain documents, with a clear definition of scope of review, that should be initially prepared and finally completed by KEPCO E&C and if the Consultant is requested specifically to assume Professional Responsibility, then such type of services shall be defined as "Packaged Review Services."

The Packaged Review Services shall be performed under the Consultant's control and direction and the Consultant shall have Professional Responsibility for the work. Review of documents without any clear definition of scope of review and associated



Professional Responsibility shall be categorized as the "Advisory Services."

### 2.3.3 Packaged Production Services

If Consultant is requested to produce a deliverable report or document encompassing establishment of criteria, calculation, study, analysis or drawing, or group thereof, with a clear definition of scope of production and if Consultant is requested specifically to assume Professional Responsibility for the deliverables, then such type of services shall be defined as "Packaged Production Services."

The Packaged Production Services shall be performed under the Consultant's control and direction and the Consultant shall have Professional Responsibility for the work.

Production of reports or documents without any clear definition of scope of production and associated Professional Responsibility shall be categorized as "Non-Packaged Production Services."

### 2.3.4 Non-Packaged Production Services

If Consultant is requested to produce reports or documents under the sole direction and supervision of KEPCO E&C, then such type of services shall be categorized as Non-Packaged Production Services.

## 3. Method of Project Implementation

### 3.1 KEPCO E&C Policies on Basic Relationship between KEPCO E&C and the Consultant

Consultant shall observe KEPCO E&C policies throughout the entire period of Project implementation unless otherwise directed by KEPCO E&C.

KEPCO E&C's policy on basic relationship between KEPCO E&C and the Consultant in implementation of the Project may be such that KEPCO E&C will plan, organize, execute, and manage the engineering work mainly by KEPCO E&C resources with the support from the Consultant in specific areas. Project directions and engineering judgments and decisions shall be made by KEPCO E&C.

Some of the ground rules of the Project implementation in line with this principle are given below:

- 3.1.1 Development of the engineering procedures for SHN 3&4 shall be based upon the basic material chosen by KEPCO E&C. In adapting basic material for the SHN 3&4 Project, decisions shall be made by KEPCO E&C, while KEPCO E&C may consult with the Consultant as necessary. The formats and contents of certain drawings and some part of the numbering system may be organized differently from those of the SHN 3&4 Project.
- 3.1.2 The engineering standards and computer programs, which the SHN 3&4 will be based upon, shall be KEPCO E&C's standards and programs where they are available, and/or other standards and programs that KEPCO E&C designates for the areas where KEPCO E&C's standards and programs are in the course of development.
- 3.1.3 The Project organization shall be defined by KEPCO E&C. The Consultant's personnel shall be assigned to the tasks of the organization defined by KEPCO E&C.
- 3.1.4 Project directions shall be given according to the KEPCO E&C project organization. Consultant personnel assigned to the tasks in the KEPCO E&C organization shall report to their KEPCO E&C supervisors.
- 3.1.5 The majority of the internal meetings and memoranda shall be executed in Korean language. However, major project, related activities and document on which the consultant could provide advisory services will be discussed and drafted in English. The appropriate Consultant's individual (either in Onshore or Offshore) should be included in the discussion or the document distribution. The recipient of the memoranda in Korean, when his Consultant co-worker should be informed of the subject, should translate them for him.

## 3.2 Project Organization and Positions

The Project organization will consist of various organization groups. The organization groups and their associated positions are described in Appendix C. Titles of consultant and associated task descriptions are shown in Appendix D.

### 3.3 Consultant Qualification Requirements

Qualification requirements for Consultants are provided in Appendix D, "Suggested Plan for Task Description, Qualification, and Assignment of Consultant." The Consultant shall supply only qualified personnel for task assignments in accordance with these requirements unless otherwise specified in the specific personnel assignment requests for the new assignments stated in the Paragraph 3.12 of this Section 3 and Article 30.2.1 of Section 1 in Chapter III or for replacement, as stated in Article 30.2.2 of Section 1 in Chapter III..

The years of experience required for the task titles listed in this Appendix D are intended to be guidelines. However, all candidates shall have the indicated experience including minimum one (1) year experience, counted backward from the resume submittal date, working for the Consultant. In the event that Consultant's recommended assignee does not have the years of experience listed and one (1) year experience working for the Consultant, the Consultant shall provide its justification for recommending the individual. The justification shall include the individual's sufficient years of experience in a task or tasks similar to that for which he is recommended.

### 3.4 Communication Channels

Work assignments for Advisory and Non-Packaged Production Services may be given directly to each Consultant. However, when the need arises to communicate with the consultant for administrative purposes, or for matters concerning Packaged Review or Packaged Production Services, the KEPCO E&C contacts shall be as follows:

- o Onshore affairs: The Advisor to KEPCO E&C's Assistant Project Manager, who will simultaneously function as Consultant's Onshore Representative.
- o Offshore affairs: The Advisor to KEPCO E&C's Assistant Project Manager or The Consultant's OTS Coordinator.

### 3.5 Type of Personnel Assignment

All type of personnel assignments will be authorized by Work Order. The Consultant's service for which direct labor is billable shall be provided in the following forms:

### 3.5.1 Type A: Task Assignments in Korea

The Consultant shall assign its personnel to tasks at KEPCO E&C's home or site office. Duration and scopes will be discussed through OTS Request and mutually agreed between KEPCO E&C and Consultants.

The Task assignment periods shall be counted from the first actual working day to the last actual working day.

#### - Long Term Assignment

The Consultant shall assign its personnel to tasks in KEPCO E&C's home or site office for a duration longer than or equal to two hundred and seventy (270) days.

#### - Short Term Assignment

The Consultant shall assign its personnel to tasks in KEPCO E&C's home or site office for a duration longer than or equal to sixty (60) days but shorter than two hundred and seventy (270) days.

### 3.5.2 Type B: Task Trips (Dispatch of visiting engineers)

The Consultant shall send qualified personnel to KEPCO E&C home office or KEPCO E&C Site, on business trip for a duration shorter than sixty (60) days counted from the first actual working day to the last actual working day to perform specific tasks defined by KEPCO E&C and/or those approved by KEPCO E&C based on the Consultant's recommendation.

### 3.5.3 Type C: Offshore Technical Support (OTS)

The Consultant shall provide its home office management and/or technical support based on KEPCO E&C's request. For certain special tasks, KEPCO E&C personnel may be dispatched to Consultant's Home-Office where the tasks will be carried out by those KEPCO E&C personnel with various types of assistance from the Consultant. Such types of Consultant's assistances shall also be classified under the "OTS" category.

## 3.6 Manpower Assignment Plan

Appendix D, "Suggested Plan for Task Description, Qualification, and Assignment of Consultant" shows the manpower assignment plan. It is only indicative of KEPCO E&C's preliminary analysis of Project requirements. Actual manpower assignment shall be made on an "as requested basis". KEPCO E&C will do its best to adhere to the assignment plan; however, KEPCO E&C shall have the right

to deviate from the planned discipline, duration and manhours and shall have the right to change the required personnel grade and/or qualification requirements.

### 3.7 Supply of Personnel and Establishment of Project Organization Groups

Upon receiving notification from KEPCO E&C, the Consultant shall promptly organize an overall project operation system in accordance with KEPCO E&C's policies and instructions. The project operation system should include:

- o recruiting and dispatching of task assignees Onshore and, if any, Offshore
- o operation of project organizational groups

If any legal process is needed to establish project organization groups away from the Consultant's home office, the timely establishment and its functioning shall be entirely the responsibility of the Consultant.

### 3.8 Individualized Efforts Versus Collective Efforts

Upon receipt of request from KEPCO E&C for Advisory Services or Non-Packaged Production Services, Consultant (including Visiting Engineers) shall provide services on an individual, best effort basis as described in Article 11, "Warranty and Liability" of Section 1 in Chapter III.

Upon receipt of request from KEPCO E&C for Packaged Review Services or Packaged Production Services, the Consultant shall provide services on a collective effort basis and shall assume Professional Responsibilities.

### 3.9 Coordination of Interfaces with External Entities

The manpower supplied by the Consultant will be utilized in various possible manners within the boundary of the work scope and the defined methods of performance, including carrying out the task of assisting KEPCO E&C with interface coordination and communication with entities such as the NSSS, the T/G, the BOP vendors, and the task of sensitive communications with the BOP vendors during the Bid evaluation periods. Accordingly, the Consultant shall use its best efforts in representing KEPCO E&C's and KHNP's interest in such activities.

### 3.10 Cooperation

The Consultant shall work in close cooperation with KEPCO E&C. To this end, the Consultant shall keep KEPCO E&C informed with respect to the performance of the Services, and shall consult KEPCO E&C regarding all relevant information and decisions covering the performance of the Services.

### 3.11 Instructions

In the performance of the Services, the Consultant shall comply with instructions given by KEPCO E&C. Such instructions will be in writing for important matters. The Consultant shall be entitled to rely on the information furnished and the instructions given by KEPCO E&C. However, the Consultant will promptly review the said information and instructions, and the Consultant shall exercise its professional judgment as to the engineering and economic soundness and completeness of such information and instructions. If there is any objection, the Consultant shall inform KEPCO E&C.

### 3.12 Submittal and Approval of Task Assignees Resumes

Upon receipt of KEPCO E&C's written request for personnel assignment, the Consultant shall submit to KEPCO E&C for approval, professional resumes of the Consultant's personnel to be assigned Onshore (long term and short term assignments) and Offshore in accordance with the procedures and time frame set forth in Article 30, "Assignment and Termination of the Consultant Personnel" of Section 1 in Chapter III, the manpower assignment plan stated in Paragraph 3.6, and the said written request. Such submittal shall include category code, Actual Base Salaries, family status (Onshore assignment only), task descriptions, and qualification requirements. The request for each personnel assignment and subsequent authorization shall be in accordance with Article 30, "Assignment Termination of the Consultant Personnel" of Section 1 in Chapter III.

The Consultant shall not increase Actual Base Salaries of the recommended Consultant's candidates to give special benefit for assignment under this Agreement.

### 3.13 Monthly Progress and Control Report

The Consultant shall submit to KEPCO E&C a Monthly Progress and Control Report in the format approved by KEPCO E&C. These reports shall provide all information reasonably necessary to KEPCO E&C. The form of the Monthly Progress and Control Report will be mutually agreed between KEPCO E&C and the Consultant and the contents thereof shall typically include:

- Major activities accomplished during the past month
- Updated schedule
- Schedule restraints and action required
- Major commercial issues, if any.

### 3.14 Sequence of Work

The Consultant shall complete its performance of the Services in such sequence as requested by KEPCO E&C.

### 3.15 Observation of Project Operation and Control System

The Services shall be performed in accordance with KEPCO E&C's procedures which shall reflect the Project Operation and Control System that KEPCO E&C establishes.

### 3.16 Personnel Administration

For the Packaged Production and Packaged Review Services, the Consultant shall have complete charge of and full responsibility for the personnel engaged in the performance of the Consultant's Services.

For the Advisory and Non-Packaged Production Services, the responsibility of the Consultant and the authority of KEPCO E&C regarding the selection, assignment, relocation, replacement, and/or termination of the Consultant's personnel are referred to in Article 11, "Warranty and Liability" and Article 30, "Assignment and Termination of the Consultant Personnel" of Section 1 in Chapter III.

### 3.17 Requests for Packaged Review Services and Packaged Production Services

Request for Packaged Review Services and Packaged Production Services shall be made by KEPCO E&C in writing in the form of "Packaged Services Requests." Upon receipt of requests for specific Packaged Review Services and/or Packaged Production Services to be performed by the Consultant, the Consultant shall review such requests for acceptance based on schedule requirements, mutually agreed upon acceptance criteria, and available resources and Consultant shall provide KEPCO E&C with a work plan addressing confirmation of scopes, resources responsible for preparation, review and approval, as well as their contact information. Upon acceptance by the Consultant, or adjusted as agreed upon by both parties, the requests shall be formalized as work orders (hereinafter referred to as Work Order). In case the Consultant rejects a request, KEPCO E&C, at its sole resources and at its sole discretion, may find other sources for supply of the relevant Services other than the Consultant and accordingly, the Agreement Manhours and Agreement Amount stated in Article 4, "Agreement Amount and Compensation," shall be reduced in accordance with Article 7, "Revisions" of Section 1 in Chapter III. The deliverables for authorized services shall be presented to KEPCO E&C for acceptance based on the conditions specified in the relevant Work Orders.

Requests for Advisory Services and Non-Packaged Production Services shall be made by issuance of Work Orders which shall be solely prepared by KEPCO E&C.

### 3.18 Quality Assurance Program

3.18.1 Activities provided by the Consultant shall be complied with the QA requirements of ASME NQA-1 2008 edition and 2009 addenda as follows and be audited by KEPCO E&C.

- 1) The personnel participating in Type A (Paragraph 3.5.1) and B (Paragraph 3.5.2) shall perform the activities in accordance with the KEPCO E&C QA program and implementing procedures.
- 2) The personnel participating in Type C (Paragraph 3.5.3) shall perform the activities in accordance with the Consultant's QA Manual and procedures. The Consultant's QA Manual shall meet the requirements of ASME NQA-1 and the Consultant's QA program and revisions thereto shall be reviewed and approved by KEPCO E&C prior to use.



- 3) The Approval of the Consultant's QA program does not relieve the Consultant of the obligation to comply with the requirements of the Agreement.
- 4) Within 30 days afterward Contract, the Consultant shall submit one (1) controlled copy of its QA program for KEPCO E&C's approval.

# **APPENDIX A**

## **New Design Feature for SHN 3&4**

## 1. ARCHITECTURAL

ITEM No.	SUBJECT	DESCRIPTION
A01	Application of the NRC RG 1.54 Rev.3	<ul style="list-style-type: none"> <li>Applying the latest Regulatory Guide(RG 1.54 Rev.3) for the selection, application, qualification, and design of protective coatings</li> </ul>

## 2. CIVIL STRUCTURAL

ITEM No.	SUBJECT	DESCRIPTION
S01	Change of Concrete Pouring Step for Reactor Containment Building Exterior Wall	<ul style="list-style-type: none"> <li>To reduce the total steps of concrete placing work from 18 step to 16 step, increase the concreting height from 10ft to 11ft</li> </ul>
S02	Application of the KEPIC SGE (AISC 360-10)	<ul style="list-style-type: none"> <li>KEPIC SGE that applied to the non-nuclear safety-related steel structures was discarded and replaced with KEPIC SGE (AISC 360-10) of new technical standards. Applying the latest new technology standard KEPIC SGE for the non-nuclear safety-related steel structures</li> </ul>
S03	Soil-structure Interaction (SSI) Analysis	<ul style="list-style-type: none"> <li>Seismic analysis of seismic category I and II structures considering soil-structure interaction effects, etc. in accordance with new regulatory requirements</li> <li>Ground contact ratio and dynamic soil pressure calculation from the soil-structure interaction analysis results</li> <li>Methodology to consider the nonlinearity due to the foundation uplift in the soil-structure interaction analysis, when the ground contact ratio is less than 80 percent.</li> </ul>
S04	Application of the System Supports	<ul style="list-style-type: none"> <li>Apply bolt assembling method for non-nuclear safety-related HVAC duct, cable tray, and conduit support</li> </ul>
S05	Application of the Complex Modules	<ul style="list-style-type: none"> <li>Complex module design for AAC DG building.</li> </ul>

### 3. ELECTRICAL

ITEM No.	SUBJECT	DESCRIPTION
E01	Design of AAC D/G	<ul style="list-style-type: none"> <li>Design of AAC DG for each unit and tie between two AAC DGs</li> </ul>
E02	Design of DC Ground Monitoring System	<ul style="list-style-type: none"> <li>Design of Channel C &amp; D Class 1E batteries with duty cycle of 24 hours to cope with SBO</li> </ul>

### 4. INSTRUMENTATION AND CONTROL

ITEM No.	SUBJECT	DESCRIPTION
J01	Accident Monitoring Instrumentation (AMI) Analysis Report (RG 1.97, Rev. 5)	<ul style="list-style-type: none"> <li>Selection and documentation of Accident Monitoring Variables and development of qualification program based on the RG 1.97, Rev. 5</li> </ul>
J02	Seismic Annunciator at the Site Fire Station	<ul style="list-style-type: none"> <li>Design to provide an alarm signal to the site fire station in seismic event</li> </ul>
J03	A/E Interface Design by Introducing ASTS	<ul style="list-style-type: none"> <li>Interface design to perform a fast reactor trip from the Automatic Seismic Trip System (ASTS)</li> </ul>
J04	Applying Safety Class of Instrumentation on Spent Fuel Pool	<ul style="list-style-type: none"> <li>To design temperature sensor located inside of spent fuel pool as safety class.</li> </ul>
J05	Design against Common Cause Failure (CCF)	<ul style="list-style-type: none"> <li>Interface design according to the Diverse Protection System(DPS) - safety injection actuation signal.</li> </ul>
J06	Human Factors Engineering Program Review Model(Rev. 3)	<ul style="list-style-type: none"> <li>Development of Human Factor Elements responded to Severe Accident and Beyond DBE</li> <li>Development of Human Factor Elements responded to Deterministically Important Human Action</li> </ul>
J07	Cyber Security	<ul style="list-style-type: none"> <li>To identify critical system &amp; critical digital assets and perform cyber security evaluation &amp; controls</li> </ul>

## 5. MECHANICAL

ITEM No.	SUBJECT	DESCRIPTION
M01	Main Steam System (MS)	<ul style="list-style-type: none"><li>○ System design considers the requirement of RG 1.20 (comprehensive vibration system) for steam generator interface</li></ul>
M02	Fuel Handling Area HVAC System (VF)	<ul style="list-style-type: none"><li>○ This system provides the suitable environmental conditions for fuel handling area in Aux. Building considering the increased storage capacity of Spent Fuel Pool (SFP) from 20 years to 60 years, which makes VF system revised based upon the changed layout and interfaced system configuration</li></ul>

## 6. NUCLEAR

ITEM No.	SUBJECT	DESCRIPTION
N01	Design against the Loss of Large Area (LOLA)	<ul style="list-style-type: none"> <li>○ Review of procedure and guidance available to support the Phase 1 assessment and provide recommendations for such procedures and guidance during LOLA event. Evaluate of procedures and provisions for systems, structures and components capable of supporting SFP (Phase 2) and core cooling (Phase 3) in accordance with NEI 06-12. Identify mitigation strategies and design enhancement for LOLA event.</li> <li>○ Other mitigation strategies for the LOLA event identified in NEI 06-12 should be evaluated and design enhancements, if required, should be implemented</li> </ul>
N02	Accident Management Program	<ul style="list-style-type: none"> <li>○ Accident management program should be prepared as an OL application document for SHN 3&amp;4</li> <li>○ Accident management scope should include the accidents due to multiple failure, beyond design basis external hazards including man-made hazards such as large commercial aircraft impact, and the causes to threat containment integrity after core damage</li> <li>○ Severe accident prevention and management capabilities should be evaluated</li> <li>○ Deterministic analysis and probabilistic risk assessment should be performed to evaluate radiation release to environment within acceptable limits</li> </ul>
N03	Multiple Spurious Operation (MSO) Analysis	<ul style="list-style-type: none"> <li>○ MSO analysis should be performed in accordance with NEI 00-01 Rev.3 to meet the requirements stipulated in RG 1.189 Rev.2</li> <li>○ Conduction of expert panel review to identify the MSO scenario applicable to SHN 3&amp;4 and MSO analysis and detailed circuit analysis should be performed to resolve MSO concerns</li> <li>○ Applicable resolutions for failed MSO scenarios based on MSO analysis results, which may include fire modeling evaluation using FDT for “important” to safe shutdown success paths, should be figure it out and implemented in the design and construction of the MSO equipment and associated cables</li> </ul>

ITEM No.	SUBJECT	DESCRIPTION
N04	Minimization of Contamination and Radioactive Waste Generation	<ul style="list-style-type: none"> <li>○ Design philosophy of minimization of contamination and radioactive waste generation shall be applied to the design and operation of SHN 3&amp;4 in accordance with RG 4.21</li> <li>○ Appropriate design process and procedures should be developed to satisfy the regulatory positions stipulated in RG 4.21</li> <li>○ All SSCs containing or contacting with radiative materials should be identified and evaluated in terms of Appendix A to RG 4.21</li> </ul> <p>SSC design and operating procedures or programs, as minimum, should be evaluated with regard to all measures listed in Appendix A to RG 4.21. If appropriate program or procedure does not exist, then they should be developed for the system designers or plant utility.</p>

## 7. PLANT DESIGN

ITEM No.	SUBJECT	Design Improvement
PO1	Design Improvement of Spent Fuel Pool	<ul style="list-style-type: none"> <li>○ Design change of building, system and facility for the enlargement of Spent Fuel Pool</li> </ul>
PO2	Environmentally Assisted Fatigue Evaluation for Safety Class 1 Piping	<ul style="list-style-type: none"> <li>○ Implementation of environmentally assisted fatigue evaluation of piping components based on the USNRC RG 1.207 and alternative design</li> </ul>

## 8. EQUIPMENT QUALIFICATION

ITEM No.	SUBJECT	DESCRIPTION
G01	Environmental Qualification Data Base	<ul style="list-style-type: none"> <li>○ To configure environmental qualification equipment list and their information on a database to meet 10CFR50.49 Requirement</li> </ul>

## **APPENDIX B**

### **List of Key Design Activities**



## 1. GENERAL

- o Project design criteria manual
- o Site plot plan
- o System and structural design verification

## 2. ARCHITECTURAL

### 2.1 Design Criteria

General and specific design criteria related to the building exterior and interior wall material types, roofing types, door and hardware scheduling, coating and painting, and elevator selection, etc.

### 2.2 Plan for Overall Plant Security System and Design for Security Interface Access Control Hardware

### 2.3 Plan for Personnel Ingress and Egress from Radiation Areas and Plan for Emergency Exit Routes

### 2.4 Design and Preparation Drawings for the Architectural Finishes, Equipment and Materials Applied to the All Buildings and Structures.

### 2.5 Design and Preparation Drawings for the Special Construction as Follows;

- o Sealing work for mechanical and electrical opening/penetration
- o Fire proofing on structural steel
- o Coating and painting work for the surfaces of building and equipment

### 2.6 Structural Analysis, Design and Preparation Drawings for the Followings:

- o Fire pump & water/wastewater treatment building
- o Cold machine shop
- o Chlorination building
- o Security facility structure

## 3. CIVIL STRUCTURAL

### 3.1 Design Criteria

- o General design criteria and specific criteria for individual structures

### 3.2 Major Material Specifications

- o Cement
- o Reinforcing steel bar
- o Reactor containment building post-tensioning system
- o Reactor containment building liner plate system
- o Stainless steel liner work
- o Concrete laboratory equipment
- o Structure steel

### 3.3 Seismic Analysis, Structural Analysis, Design and Preparation Drawings for the Followings:

- o Reactor containment building
- o Auxiliary building
- o Turbine generator building & turbine pedestal
- o Compound building
- o CCW HX building
- o CW & ESW intake structure
- o Safety-related AAC/DG building

### 3.4 Structural Safety Evaluation

### 3.5 Licensing Support and Design Verification for Seismic Analysis

- o Licensing support regarding soil-structure interaction analysis
- o Peer review of design verification for seismic analysis calculations

## 4. ELECTRICAL

### 4.1 Design Criteria

- o General design criteria and specific systems design criteria for major systems

### 4.2 SAR Input and Licensing Support including Applicable Codes and Standards Conformation

### 4.3 Calculation and Analysis for Electrical System

- o Equipment sizing and selection
- o Auxiliary power system verification

- o Relay setting calculation

#### 4.4 General System Drawings

- o Station single line diagram
- o Single line diagram for main and auxiliary power systems
- o Control logic and schematic diagram for main and auxiliary power system

#### 4.5 General Arrangement Drawings

- o Cable tray layouts including transformer and bus arrangements especially for turbine/generator control and auxiliary buildings penetration areas, and switchgear areas

#### 4.6 Major Material Specifications

- o Generator circuit breaker
- o Power transformers
- o Switchgears
- o Electrical penetration assemblies
- o Isolated phase bus
- o DC motor control center

### 5. INSTRUMENTATION AND CONTROL

#### 5.1 Design Criteria

- o General design criteria and specific design criteria for major systems

#### 5.2 Development of the Scope of Computer Application and Control Philosophy

#### 5.3 P&IDs, C&IDs for Radiation Monitoring System, Sampling System and Containment Monitoring System

#### 5.4 Application of State-of-the-art Advanced Technology for Instrumentation and Control System

#### 5.5 Development of Basic Design and Detailed Design of Computer Based Digital MMI

#### 5.6 Human Factors Engineering (HFE) Based on the Recent Applicable Requirements to Digital MMI

- 5.7 HFE Verification and Validation of MMI
- 5.8 Detailed Engineering and Licensing Supports for the Digital Plant Control System
- 5.9 Inputs to System Designs in Support of Mechanical and Nuclear Groups for Major Systems.
- 5.10 PSAR/FSAR Inputs and Preparation
- 5.11 Preliminary Control Room Design
  - o Control room general arrangement
  - o Control panel layouts
  - o Human factors engineering analysis
  - o MMI display design
- 5.12 Major Material Specifications
  - o Control valves
  - o Plant control system
  - o Vibration monitoring system
  - o Radiation monitoring system
  - o Sampling system
  - o Control panels
  - o Instruments
- 5.13 Physical Engineering Drawings
  - o Instrument installation detail drawings
  - o Instrument location drawings
  - o Tubing isometric drawings
  - o Level bridle drawings
- 5.14 Cyber Security Design and Related Activities
  
- 6. MECHANICAL
- 6.1 Design Criteria
  - o General and system design criteria for the main mechanical systems

## 6.2 Studies and Calculations

- Circulating water system study including the parameters of circulating water pumps, and plan of piping
- Heat balance
- Heat rejection optimization study
- Equipment parameters corresponding to condensate pumps, heater drain pumps and feedwater heaters
- Preliminary study of HVAC arrangement
- Transient Analysis

## 6.3 Major System Design: P&IDs and System Descriptions

The following systems covered:

- Main steam
- Condensate
- Feedwater
- Auxiliary feedwater
- Heater drain
- Extraction
- Circulating water
- Service water
- Turbine generator building closed water
- Diesel generator fuel oil
- Chilled water
- Reactor containment purge
- Condensate polishing
- Seismic Category I AC Diesel Generator (AAC DG)
- Compressed Air (Instrument Air and Service Air)
- HVAC for:
  - Reactor containment building
  - Turbine generator building
  - Compound building
  - Auxiliary building including main control room
  - Safety-related AAC DG building

## 6.4 Major Material Specifications:

- Main condenser and auxiliaries
- Condensate pumps & FW booster pumps
- Feedwater heaters & deaerator

- o Main feedwater pumps
- o Start-up feedwater pumps
- o Feedwater pump turbines
- o Auxiliary feedwater pump & drivers
- o Circulating water pumps
- o Safety-related air handling units and cubicle coolers
- o Safety-related air cleaning units and duct heaters
- o Safety-related chillers
- o Field erected tanks
- o Turbine generator building main crane & fuel handling area crane
- o Reactor containment building polar crane
- o Emergency diesel generator (Class 1E)
- o Seismic Category I AC Diesel Generator (AAC DG)
- o Main Steam Safety Valve
- o Safety/Relief valve

## 7. NUCLEAR

### 7.1 Design Criteria

- o Based on NSSS standard information package for interface
- o General design criteria and system design criteria for the nuclear systems, radiation protection, and plant safety analysis
- o Severe accident analysis and mitigation design to meet the severe accident requirements of 10 CFR 50.34(f), SECY-93-087, and KURD (Korean Utility Requirements Document), etc.

### 7.2 Studies and Calculations

- o Nuclear systems studies including incorporation of design improvement items
- o Studies and calculations related to radiation areas including dose and shielding calculation for normal and accident cases
- o Plant overall safety studies and analysis including containment P/T analysis, subcompartment P/T, HELBA, LBB, flooding, missile, fire hazard analysis, post-fire safe shutdown analysis including multiple spurious operation, hazard analysis (natural and man-made including AIA and LOLA), and severe accident concerned studies and so on.

### 7.3 Major System Design: P&IDs and System Descriptions

The following systems are covered:

- o NSSS such as reactor coolant, safety injection/shutdown cooling, chemical and volume control, safety depressurization (P&ID only)
- o Reactor coolant gas vent
- o Containment spray
- o Containment hydrogen control
- o In-containment water storage
- o Combustible gas control
- o Steam generator blowdown
- o Spent fuel pool cooling and cleanup
- o Essential service water
- o Component cooling water
- o Gaseous radwaste
- o Liquid radwaste
- o Solid radwaste
- o Radioactive laundry
- o Radioactive drain
- o Primary sampling

#### 7.4 PSAR/FSAR

PSAR/FSAR excluding all items/sections falling in NSSS, T/G or client scope of responsibility, and representing combined agreements of client, A/E, and NSSS

#### 7.5 Major Material Specifications

- o Safety related centrifugal pumps
- o Safety related heat exchangers
- o Safety-related shop fabricated pressure vessels and tanks (safety-related)
- o Radwaste filters
- o Liquid radwaste system (R/O package)
- o Gaseous radwaste system
- o Passive autocatalytic recombiner
- o Hydrogen ignitor
- o Health physics equipment

## 8. PLANT DESIGN

### 8.1 Design Criteria

- o General design criteria and specific design criteria

## 8.2 General Arrangement Drawings of the Major Power Block Structures

- o Plans and sections required to present the proposed plant to the Owner and obtain approval of the concepts

## 8.3 Drawings of Piping and Equipment Location

- o Auxiliary building
- o Turbine generator building
- o Reactor containment building
- o Compound building
- o Yard area

## 8.4 Major Piping Systems Studies including Review for Potential Stress and Support Problems

## 8.5 Laydown Studies for Turbine Generator Building and Reactor Containment Building

## 8.6 Major Piping and Valve Specifications

## 8.7 Piping Material Selection

# 9. EQUIPMENT QUALIFICATION

## 9.1 Design Criteria

- o General and specific criteria for qualification of safety-related equipment
- o Design criteria for the piping penetration sleeve assemblies

## 9.2 Studies and Calculations

- o Seismic calculation for safety-related equipment
- o Environmental calculation for safety-related equipment
- o Generic calculation for allowable nozzle loads
- o Penetration design and analysis

## 9.3 Review of Equipment Qualification Report

- o Seismic qualification
- o Environmental qualification
- o ASME Section III design report



## 9.4 Special Tasks

- o Licensing support
- o Application for OBE damping study
- o Synergistic effect for organic material study

## 10. MATERIAL ENGINEERING

### 10.1 PSAR/FSAR Input and Preparation

### 10.2 Major Material Specifications

- o Standard specifications for welding method and welding materials
- o Non-destructive examination
- o Standard specifications for anticorrosion

### 10.3 Review of Document

- o Project specifications for material, fabrication and test/examination requirements
- o Vendor procedures related to material, fabrication and test/examination requirements
- o Trouble shooting related to material, corrosion, fabrication and test/examination requirements

### 10.4 Special Tasks

- o Activities related to material application, corrosion control and special processes, such as welding, heat treatment, NDE, etc.

## 11. START-UP ENGINEERING

### 11.1 PSAR/FSAR Input and Preparation

### 11.2 Scoping of Diagram by Start-up Subsystem

- o P&ID
- o Single line diagram
- o Cable block diagram

### 11.3 Test Guideline

- o Construction acceptance test procedure guideline
- o Flushing procedure guideline
- o Preoperational and start-up test procedure guideline
- o System operating procedure guideline

## **APPENDIX C**

### **Preliminary Project Organization, Organization Groups and Positions**

## 1. Groups and Positions

### 1.1 Groups and Positions for Engineering Services

- o KEPCO E&C Home-office Group (Gimcheon)

KEPCO E&C positions will consist of Project Manager (PM), Assistant Project Manager (APM), Engineering Manager (EM), Engineering Group Supervisors (EGSs), Group Supervisors (GSs), NSSS Coordinator (N-Coord), T/G Coordinator (T-Coord), Functional Group Leaders (FGLs), Group Leaders (GLs), Responsible Engineers (REs), and others.

Consultant positions will be Responsible Engineers except one Consultant (Advisor-to-APM) who represents all consultant Onshore personnel and function as the Onshore communication for KEPCO E&C.

- o KEPCO E&C Site Group

KEPCO E&C positions will consist of Site Manager, Deputy Site Manager, Engineering Group Supervisors (EGSs), Functional Group Leaders (FGLs), Responsible Engineers (REs), and Field Designers.

Consultant positions will be Responsible Engineers.

- o Consultant Home Office Group

There will be no KEPCO E&C positions. Only OTS Coordinator will be assigned.

## 2. Primary Responsibilities of the Consultant Positions and Organization Groups

### 2.1 KEPCO E&C Home-Office Group and Site Group

Regarding qualification of engineers, it must be verified that all of the Consultant have sufficient competency and ample experience in the fields of related expertise, and have been or can be qualified as a registered professional engineer or equivalent as appropriate in addition to the qualification requirements specified in Appendix D.

Consultant will consist of General Engineers (GEs) and Specialists (SPs). The General Engineers shall perform more generalized engineering tasks while the Specialists shall perform more specialized engineering tasks.

The primary responsibilities of Consultant are as follows:

- o Consultant will be required to perform any type of the Services defined in Section 2.3 "Types of Services" of Chapter IV, as required by the Project needs and as directed by KEPCO E&C.

- o Consultant will perform tasks as generally described in Appendix D "Suggested plan for Task Description, Qualification, and Assignment of Consultant Personnel." In addition to the tasks described above, the following tasks will be generally performed by Consultant.
- o Provide advice and consulting services to KEPCO E&C by reviewing the engineering outputs, drafting letters and memos, attending meetings, and performing studies and tasks as requested by KEPCO E&C.
- o Assist KEPCO E&C engineers in assuring that the work carried out by KEPCO E&C engineers meets the regulatory requirements and engineering standards.
- o Assist KEPCO E&C with interface coordination and communication with such entities as the NSSS, T/G, and BOP vendors and the task of sensitive communications with the BOP vendors during the Bid evaluation periods.
- o Perform the engineering work assigned initially and/or additionally as requested by KEPCO E&C.

## 2.2 Offshore Group

The Consultant's home office support for Services of Offshore Technical Support (OTS) type will be coordinated by the OTS Coordinator.

## **APPENDIX D**

### **Suggested Plan for Task Description, Qualification and Assignment of Consultant**

## 1. ARCHITECTURAL

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
1. OTS	<ul style="list-style-type: none"> <li>○ Technical assistance and resolution for architectural issues during design, construction and licensing process</li> <li>○ Review and design verification for plant security design, emergency exit route plan, and fire protection design</li> <li>○ Technical/licensing support for the design of protective coating systems</li> <li>○ Technical assistance and resolution for the design of opening and penetration seals</li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	500 (3.1)	10								9
	<b>Subtotal</b>	<b>500</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## 2. CIVIL STRUCTURAL

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
<p>1. Onshore Assignment Structural &amp; Construction, GE (More than 15 Years Applicable Experience in Structural Design) Duration and scope of service for onshore assignment will be confirmed by OTS Request and authorized by Work Order.</p>	<ul style="list-style-type: none"> <li>○ General issues related with structural design               <ul style="list-style-type: none"> <li>- Evaluation and review of design criteria</li> <li>- Technical support for the major Issue related to the license requirement</li> <li>- Technical consultation during design and construction phase</li> <li>- Design verification (third party review)</li> </ul> </li> <li>○ Reactor containment building structural design               <ul style="list-style-type: none"> <li>- Review and evaluation for new design requirements</li> <li>- Technical support for applying new licensing requirements</li> <li>- Design verification for structural analysis and design</li> </ul> </li> <li>○ Safety related Buildings and Structures design               <ul style="list-style-type: none"> <li>- New requirements in RGs and SRPs with regard to seismic analysis, structural analysis and design</li> <li>- Detailed analysis, evaluation and licensing support for application of the advanced design concept</li> </ul> </li> </ul>	2,700 (16.2)	10								9



Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule							
			'23	'24	'25	'26	'27	'28	'29	'30
2. OTS	<ul style="list-style-type: none"> <li>○ Technical supports for new licensing requirements <ul style="list-style-type: none"> <li>- New requirements in RGs and SRPs with regard to seismic analysis, structural analysis and design</li> </ul> </li> <li>○ Reactor containment building structural design <ul style="list-style-type: none"> <li>- Technical support for applying new licensing requirements</li> <li>- Review and technical support for constructability</li> </ul> </li> <li>○ Safety related buildings structural design <ul style="list-style-type: none"> <li>- Technical support for licensing of complex module design including SC structure module</li> <li>- Detailed analysis, evaluation and licensing support for application of the advanced design concept</li> </ul> </li> <li>○ Licensing Support and Design Verification for Seismic Analysis <ul style="list-style-type: none"> <li>- Licensing support regarding soil-structure interaction analysis</li> <li>- Peer review of design verification for seismic analysis calculations</li> </ul> </li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	2,450 (15.0)	10							9
	<b>Subtotal</b>	<b>5,150</b>								

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

### 3. ELECTRICAL

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
1. Onshore Assignment Plant Electrical Design, GE (More than 15 Years Applicable Experience in Electrical System Design) Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.	<ul style="list-style-type: none"> <li>○ General</li> <li>- Technical support and review of application for electrical power system ( main power system, aux. power system including AAC D/G, DC/IP system, etc., )</li> <li>- Technical support for the major Issue related to electrical design, construction, and the license.</li> <li>- Design verification (third party review)</li> </ul>	1,800 (10.8)		1-12							

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule							
			'23	'24	'25	'26	'27	'28	'29	'30
2. OTS	<ul style="list-style-type: none"> <li>○ Electrical power system <ul style="list-style-type: none"> <li>- Technical support and review of application for the latest code and standard</li> <li>- Technical support and review of application for electrical power system ( main power system, aux. power system including AAC D/G, DC/IP system, etc., )</li> <li>- Technical support for the major Issue related to electrical design, construction, and the license.</li> <li>- Design verification (third party review)</li> </ul> </li> <li>○ NSSS &amp; TG <ul style="list-style-type: none"> <li>- Tasks related to NSSS &amp; T/G Interface</li> <li>- Tasks related to interface for overseas materials procurement/design</li> </ul> </li> <li>○ Raceway system and electric facility system design <ul style="list-style-type: none"> <li>- Technical review and support for the cable installation and qualification requirement for increasing frequency in use of Fiber-optic cable</li> <li>- Technical support for the tray support design</li> <li>- Technical support and review of instrumentation grounding system design</li> <li>- Design verification (third party review)</li> </ul> </li> <li>○ Production of the deliverables are confirmed by OTS Request and authorized by Work Order.</li> </ul>	1,500 (9.2)	10							9

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
3. Task Trip Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.	<ul style="list-style-type: none"> <li>○ Electrical power system               <ul style="list-style-type: none"> <li>- Technical support and review of application for the latest code and standard</li> <li>- Technical support and review of application for electrical power system ( main power system, aux. power system including AAC D/G, DC/IP system, etc., )</li> <li>- Technical support for the major Issue related to electrical design, construction, and the license.</li> <li>- Design verification (third party review)</li> </ul> </li> <li>○ Raceway system and electric facility system design               <ul style="list-style-type: none"> <li>- Technical review and support for the cable installation and qualification requirement for increasing frequency in use of Fiber-optic cable</li> <li>- Technical support for the tray support design</li> <li>- Technical support and review of instrumentation grounding system design</li> <li>- Design verification (third party review)</li> </ul> </li> </ul>	800 (4.9)			1						9
	<b>Subtotal</b>	<b>4,100</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

#### 4. INSTRUMENTATION AND CONTROL

Task Title (Qualification Requirements)	Task Description	MH	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
1. Task Trip Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.	<ul style="list-style-type: none"> <li>Technical review of system design and resolution of technical and licensing issues for the digital technology application</li> <li>Review of technical and licensing issues for the MCR, HFE and the MMIS including Common Mode Failure(CMF)</li> <li>Cyber Security and System Development and Operational Environment(SDOE)</li> </ul>	800 (4.9)		1-12							
2. OTS	<ul style="list-style-type: none"> <li>Licensing related task</li> <li>Resolution of special issues related to I&amp;C design including HFE</li> <li>Collection of engineering and operation experience for off-shore nuclear power plants</li> <li>Design against sever accident condition and design improvement of post Fukushima</li> <li>Cyber Security and System Development and Operational Environment(SDOE)</li> <li>Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	7,200 (44.2)	10							12	
	<b>Subtotal</b>	<b>8,000</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## 5. MECHANICAL

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
<p>1. Onshore Assignment Mechanical, GE (More than 15 Years Applicable Experience in Mechanical System Design) Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.</p>	<ul style="list-style-type: none"> <li>○ General               <ul style="list-style-type: none"> <li>- Technical support and review for mechanical system design and technical specifications</li> <li>- Technical support and review for the issues related to mechanical system design, technical specifications, construction, and the license</li> <li>- Preparing design documents and transient analysis report for mechanical system</li> </ul> </li> <li>○ Design verification for mechanical system</li> <li>○ Technical review for the application of mechanical system design improvement concept and resolution for related technical and licensing problems as followings:               <ul style="list-style-type: none"> <li>- Reviews for system design</li> <li>- Consulting and furnishing backup materials required by regulatory agency for technical issues associated with the latest design requirements and licensing requirements (RG 1.20, comprehensive vibration assessment programs)</li> <li>- Technical supports for challenging technical and/or licensing issues occurred during design &amp; construction phases</li> <li>- Managing the technical and/or licensing issues related to system designs related to the application of FAC(Flow Accelerated Corrosion) requirements                   <ul style="list-style-type: none"> <li>- Consulting and furnishing backup materials for main control room environmental configuration &amp; control room habitability(CRH) associated with the application of latest human factor engineering</li> </ul> </li> </ul> </li> </ul>	2,700 (16.2)	10								9

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
2. Task Trip	<ul style="list-style-type: none"> <li>○ General <ul style="list-style-type: none"> <li>- Technical support and review for mechanical system design and technical specifications</li> <li>- Technical support and review for the issues related to mechanical system design, technical specifications, construction, and the license</li> <li>- Preparing design documents and transient analysis report for mechanical system</li> </ul> </li> <li>○ Consulting for the construction &amp; operation practices of overseas new &amp; operating NPP to meet the regulatory requirements (RG 1.52 &amp; 1.140) and to design the optimal air cleaning system</li> <li>○ Consulting for the compressed air (Instrument Air and Service Air) systems</li> <li>○ Providing the guidance of calculation for total compressed air consumption and equipment (Air Compressor) sizing.</li> <li>○ Consulting for the HVAC outdoor design temperature practice to meet the application standard(ASHREA)</li> <li>○ Technical support and review for HVAC system equipment/duct layout design Technical supports and furnishing backup materials required by regulatory agency for technical issues during design &amp; construction phases</li> </ul>	600 (3.7)	10								9
3. OTS	<ul style="list-style-type: none"> <li>○ Review and resolution on the associated technical and licensing issues for the major mechanical system <ul style="list-style-type: none"> <li>- Reviews for system design</li> </ul> </li> </ul>										

	<ul style="list-style-type: none"> <li>- Technical supports and review for technical and licensing issues occurred during design &amp; construction phases</li> <li>- Managing the technical and licensing issues related to system design associated with the change of SAR preparation basis regulatory guide <ul style="list-style-type: none"> <li>o Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul> </li> </ul>	1,600 (9.8)	10 ▲							9 ▲
	<b>Subtotal</b>	<b>4,900</b>								

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)



## 6. NUCLEAR

Task Title (Qualification Requirements)	Task Description	MH	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
<p>1. Onshore Assignment Nuclear Design, (More than 15 Years' Experience in Nuclear System Design or BOP Safety Analysis) Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.</p>	<ul style="list-style-type: none"> <li>○ General consulting on overall nuclear discipline work in application of ALWR design concept and new design technology</li> <li>○ Provides support and assistance in the following areas;               <ul style="list-style-type: none"> <li>- System design of reactor coolant systems, SFP cooling &amp; cleanup systems and radwaste systems</li> <li>- Equipment selection, specification development, Bid evaluation and supplier document review</li> <li>- Specific technical and licensing issues related to nuclear system design, radiation protection and safety analysis</li> <li>- Design verification for nuclear system</li> <li>- Accident management program</li> <li>- Design against beyond design basis external event (BDBEE)</li> </ul> </li> </ul>	2,000 (12.0)	10								9
<p>2. OTS</p>	<ul style="list-style-type: none"> <li>○ Technical review and resolution of technical and licensing issues in the following areas of applying new design and analysis technology               <ul style="list-style-type: none"> <li>- Nuclear system design</li> <li>- Radiation protection (General design, Radiation EQ TID, PSA Level III, MAAP new model application)</li> <li>- Safety analysis</li> <li>- Application of codes and standards</li> </ul> </li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	1,700 (10.4)	10								9

Task Title (Qualification Requirements)	Task Description	MH	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
3. Task Trip Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.	<ul style="list-style-type: none"> <li>○ Independent ALARA Review</li> <li>○ Decommissioning facilitation and contamination minimization</li> <li>○ Nuclear system design</li> </ul>	750 (4.6)	10								9
	<b>Subtotal</b>	<b>4,450</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## 7. PLANT DESIGN

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule									
			'23	'24	'25	'26	'27	'28	'29	'30	'31	
<p>1. Onshore Assignment Plant Design, GE (More than 15 Years Applicable Experience in Plant Design) Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.</p>	<ul style="list-style-type: none"> <li>○ Tasks related to Class 1 piping analysis and environmentally assisted fatigue evaluation               <ul style="list-style-type: none"> <li>- Preparation for design procedures and guidelines</li> <li>- Review for piping fatigue analysis and code reconciliation</li> <li>- Review and preparation for PTTT (Pressure Temperature Time History) associated with application of new design requirement and the analysis of environment fatigue factor</li> <li>- Review for thermal stratification analysis of safety shutdown/cooling system including DVI (Direct Vessel Injection) piping and main feedwater system</li> <li>- Review for plan associated with application of new piping design (ERDS)</li> <li>- Review for design report associated with application of environmentally assisted fatigue evaluation</li> <li>- Third party review for design verification</li> <li>- Consultation on technical issues generated during design and construction</li> </ul> </li> <li>○ Tasks related to piping stress analysis and small bore piping support               <ul style="list-style-type: none"> <li>- Third party review for design verification when applying the changes in the piping stress analysis program</li> <li>- Technical support for licensing problems related to the piping stress analysis</li> <li>- Third party review for design verification associated with application of new design requirement (KEPIC SGE)</li> <li>- Technical support for seismic analysis associated</li> </ul> </li> </ul>	5,800 (34.7)		1			4					

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule							
			'23	'24	'25	'26	'27	'28	'29	'30
	<ul style="list-style-type: none"> <li>with application of new licensing regulatory requirements</li> <li>- Consultaton on the technical issues related to stress analysis</li> <li>○ Technical support based on the problems of introducing new commercial piping stress analysis program(Peps)</li> </ul>									

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
2. Onshore Assignment Plant Design, GE (More than 10 Years Applicable Experience in Plant Design)	<ul style="list-style-type: none"> <li>○ Tasks related to general piping design <ul style="list-style-type: none"> <li>- Technical consultation on design criteria/standard and licensing requirements</li> <li>- Review of technical specifications, and technical consultation and assistance in the collection of experience data when applying the changes in requirements for piping material</li> <li>- Review and consultation on new design requirement for expanding the spent fuel handling area and licensing technical issues.</li> <li>- Consultation on the licensing technical issues and new technical lists generated during design and construction</li> </ul> </li> <li>○ Tasks related to piping layout <ul style="list-style-type: none"> <li>- Review for problems generated by applying new regulation requirement to piping layout</li> <li>- Preparation and review for piping layout guideline</li> <li>- Review and resolution of technical problems in the space allocation associated with maintenance</li> <li>- Consultation on licensing and technical problems for piping layout issue.</li> <li>- Review of potential technical problems associated with application of 3D design</li> <li>- Review of technical issues with changes to the 3D CAD program(AVEVA E3D)</li> </ul> </li> </ul>	800 (4.8)		1-6							

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
3. OTS	<ul style="list-style-type: none"> <li>○ Tasks related to general piping design <ul style="list-style-type: none"> <li>- Technical consultation on design criteria/standard and licensing requirements</li> <li>- Review of technical specifications, and technical consultation and assistance in the collection of experience data when applying the changes in requirements for piping material</li> <li>- Review and consultation on new design requirement for expanding the spent fuel handling area and licensing technical issues.</li> <li>- Consultation on the licensing technical issues and new technical lists generated during design and construction</li> <li>- Technical support based on the problems of introducing new commercial piping stress analysis program(Peps)</li> <li>- Consultation on the issues related to the important technical reviews that are required during design and construction</li> </ul> </li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> <li>○ Tasks related to Class 1 piping analysis and environmentally assisted fatigue evaluation</li> <li>○ Tasks related to piping stress analysis and small bore piping support</li> <li>○ Tasks related to general piping design</li> <li>○ Tasks related to piping layout</li> </ul>	700 (4.3)									
	<b>Subtotal</b>	<b>7,300</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## 8. EQUIPMENT QUALIFICATION

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
<p>1. Onshore Assignment Equipment Qualification, GE (More than 15 Years Applicable Experience in Equipment Qualification) Duration and scope of service will be confirmed by OTS Request and authorized by Work Order.</p>	<ul style="list-style-type: none"> <li>o Tasks related to Environmental Qualification               <ul style="list-style-type: none"> <li>- Setup of environmental qualification requirement for mild installed equipment.</li> <li>- Development of evaluation methodology for pre-qualified equipment using thermal lagging and/or shielding method.</li> <li>- Technical support for challenging technical and/or licensing issue occurred during licensing phase.</li> <li>- Technical support for the issues occurred during review of Supplier's qualification document.</li> <li>- Development of practical review procedure for chemical spray application during LOCA test.</li> </ul> </li> <li>o Tasks related to seismic qualification               <ul style="list-style-type: none"> <li>- Technical support and resolution for technical issues of seismic qualification</li> </ul> </li> </ul>	1,500 (9.0)				1-12					
<p>2. Task Trip</p>	<ul style="list-style-type: none"> <li>o Tasks related to seismic qualification               <ul style="list-style-type: none"> <li>- Technical support for seismic qualification of equipment sensitive to high frequency</li> <li>- Technical support and resolution for technical issues of seismic qualification of post-Fukushima</li> <li>- Licensing support for seismic qualification</li> </ul> </li> </ul>	200 (1.2)				1-12					

3. OTS	<ul style="list-style-type: none"> <li>o Tasks related to environmental qualification <ul style="list-style-type: none"> <li>- Technical support for special task (EMI/RFI)</li> <li>- Technical support and resolution for technical issues associated with equipment qualification</li> <li>- Licensing support for environmental qualification</li> </ul> </li> <li>o Others <ul style="list-style-type: none"> <li>- Technical support for synergistic effect of organic material</li> <li>- Licensing support for seismic qualification related to Reg. Guide 1.100</li> <li>- Technical support for application of OBE damping related to Reg. Guide 1.61</li> </ul> </li> <li>o Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	1,200 (7.4)		1						9
	<b>Subtotal</b>	<b>2,900</b>								

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)



## 9. MATERIAL ENGINEERING

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
1. OTS	<ul style="list-style-type: none"> <li>○ Review of project specifications, vendor procedures and trouble shooting for material, fabrication and test/examination requirements, activities related to codes &amp; standards application</li> <li>○ Material engineering including material selection, interpretation of codes and standards, special issues related to material, welding, and corrosion</li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	600 (3.7)	10								9
	<b>Subtotal</b>	<b>600</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## 10. STARTUP ENGINEERING

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
1. OTS	<ul style="list-style-type: none"> <li>○ Technical review and resolution of technical and licensing issues for the CAT, flushing and pre-operational test procedure guidelines</li> <li>○ Technical review and resolution of technical and licensing issues for the NSSS/TG, radwaste related system pre-operational test procedure guidelines</li> <li>○ Technical review and resolution of technical and licensing issues for the problems occurred during startup work</li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	800 (4.9)	10								9
	<b>Subtotal</b>	<b>800</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## 11. QUALITY ASSURANCE

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule									
			'23	'24	'25	'26	'27	'28	'29	'30	'31	
1. OTS	<ul style="list-style-type: none"> <li>○ Application of QA related code, standard and requirement (Review of applicability for ASME NQA-1 2008 Ed.)</li> <li>○ Provision of root cause analysis and the solution of quality problems</li> <li>○ Licensing liaison activities</li> <li>○ Software Quality Assurance</li> <li>○ Operation and Improvement of Quality Assurance Procedures</li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> </ul>	100 (0.6)		1					12			
	<b>Subtotal</b>	<b>100</b>										

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## 12. COST & SCHEDULE

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
1. Onshore Assignment Cost & Schedule, GE (More than 15 Years Applicable Experience in Cost & Schedule)	<ul style="list-style-type: none"> <li>○ Provide advice and assistance in planning, development and operation of project control system as follows.</li> <li>- Review the engineering, procurement, construction and start-up integrated project schedule (IPS)</li> <li>- Review the method of progress measurement system</li> <li>- Review the schedule roll-up and roll-down system</li> <li>- Establishing the interface schedule control system for the engineering schedule, vendor information, hold items and construction schedule</li> <li>- Review and establishing the special schedule under special conditions</li> </ul>	4,000 (23.9)		11		10					
	<b>Subtotal</b>	<b>4,000</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

### 13. PROJECT MANAGEMENT

Task Title (Qualification Requirements)	Task Description	MH (MM) [No. of Engineer]	Time Schedule								
			'23	'24	'25	'26	'27	'28	'29	'30	'31
1. Onshore Assignment Project Management, Consultant's Advisor-to-APM (More than 15 Years Applicable Experience in Project Management)	<ul style="list-style-type: none"> <li>○ Provides support and advice on project management and administration</li> <li>○ Provides support and advice on technical work and overall engineering issues</li> <li>○ Reviews the engineering outputs and performs studies and tasks as required</li> <li>○ Provide review and support on the design, procurement, construction and start-up issues</li> <li>○ Production of the deliverables confirmed by OTS Request and authorized by Work Order.</li> <li>○ Consultant's Advisor-to-APM (Coordinator) may be assigned concurrently with the onshore consultants in other area.</li> </ul>	500 (3.1)	10 ▲								9 ▲
	<b>Subtotal</b>	<b>500</b>									

Note) 1 MM = 167 MH (On-Shore), 163 MH (Off-shore)

## **APPENDIX E**

### **Support Services and Facilities**

## 1. General

- 1.1 Office and related facilities at the KEPCO E&C office will be provided for the Consultant's expatriates. Office and related facilities at the KEPCO E&C office will be provided by KEPCO E&C.

## 2. KEPCO E&C Home office

KEPCO E&C, as the case may be, shall provide the services and facilities to accommodate the expatriates residing in the Gimcheon area.

### 2.1 Office for Engineering Services (KEPCO E&C office)

Office space, office facilities, office furnishings and furnitures, consumable office supplies, and reasonable office related services shall be provided by KEPCO E&C. The facility supported by KEPCO E&C will be as follow:

- Office spaces to accommodate the Consultant's assignees
- Essential furnishings, furniture, fixtures, and facilities
- Reproduction services
- Telephone, facsimile, and mail service
- All utilities, janitorial, and maintenance services
- Consumable office supplies and materials

### 2.2 Housing, Transportation, and Furniture

The Consultant shall be responsible for the housing, furniture, and furnishings of the Consultant's expatriates personnel residing in Gimcheon area. However, the living allowance set forth in Article 4.2.5.7.a) of Section 1 in Chapter III shall be paid for each long or short term expatriate.

## **APPENDIX F**

### **Formats for Bid**



Format # 1-1

**Total Estimated Bid Amount**

<b>Description</b>	<b>Onshore</b>	<b>Offshore</b>	<b>Total</b>
<ul style="list-style-type: none"> <li>o Actual Base Salaries (ABS)</li>   <li>o Overhead</li>   <li>o Fee</li>   <li>o Other Direct Costs</li>   <li>o Training for KHNP personnel</li> </ul>			
<b>Total</b>			

Format # 1-2

**Bidder's Actual Base Salaries and Estimated Manhours**

Scope of Work	Task (Classification) (1)	Grade (2)	Average Hourly Rate (3)	Estimated M/H (4)	Total
o Onshore					
- Long Term				19,900	
- Short Term				1,400	
Onshore Total				21,300	
o Offshore					
- OTS				18,850	
- Task Trips				3,150	
Offshore Total				22,000	
Grand Total				43,300	

\* The detail breakdown for the above Bid amount should be attached.

Notes:

- (1) All the tasks defined in Appendix D "Suggested Plan for Task Description, Qualification, and Assignment of consultant" must appear here.
- (2) The grade should be one of the Bidder's grade number or category codes.
- (3) Actual Base Salary shall be at the time of Bid submission.
- (4) The estimated MH shall include the travel time for assignment, return, home leave, and visiting engineer assignment and should be concurred to MH of Appendix D.

Overhead and Fee

Overhead & Fee	Rate on Actual Base Salary	Estimated Total Actual Base Salary	Total
o Overhead			
- Onshore	%		
- Offshore	%		
Subtotal Overhead			
o Fee			
- Onshore	%		
- Offshore	%		
Subtotal Fee			
Total			

Remarks: Fee = (Actual Base Salary + Overhead) × %

\* Aggregate Multiplier Rate for Original Agreement Manhours =

Format # 1-4

Other Direct Costs

Article in Section 1 of Chapter III	Item	Units (Number)	Estimated Unit Cost	Total
4.2.5.1) ~ 4.2.5.7)	1. Travel Expenses			
	o International Airfares			
	(Assignment to Onshore Services and Return)			
	- Engineers	4		
	- Family	8		
	Sub - Total			
	o Annual Home Leave			
	- Engineers	6		
	- Family	12		
	Sub - Total			
	o Business Travel in Korea	20		
	Sub - Total			
	O Visiting Engineer			
- Airfare	19			
- Per Diem (Days)	394			
Sub - Total				

Other Direct Costs (continue)

Article in Section 1 of Chapter III	Item	Units (Number)	Estimated Unit Cost	Total
4.2.5.1) - 4.2.5.7)	o Business Travel in U.S.A. (to be incurred for OTS only)	19		
	Sub - Total			
	2. Foreign Service Premium			
	o Long Term	ABS x ___ %	-	
	o Short Term	ABS x ___ %	-	
	Sub - Total			
	3. Living Allowance			
	o Gimcheon	128MM	Won	Won
	o Site	-	-	-
	Sub - Total			
	4. Education Expense			
	o Gimcheon	8MY		
	o Site	-	-	
	Sub - Total			
Other Direct Costs Total		US \$ + Won		

Remark:

\* Any items not included in this list and not specifically provided for in Other Direct Costs or elsewhere in Section 1 of Chapter III shall be deemed to be included in the Overhead.

Training cost for KHNP personnel

Courses	Items	Units (Trainees)	Period (Months)	Estimated Unit Cost	Estimated Total Cost
Mechanical Design	◦Document Transfer ◦Classroom Instruction	1	3		
Piping Design	◦Document Transfer ◦Classroom Instruction	2	3		
Nuclear Design (including severe accident)	◦Document Transfer ◦Classroom Instruction	2	3		
Station Power System Design	◦Document Transfer ◦Classroom Instruction	2	3		
Protection Relay Coordin. Design	◦Document Transfer ◦Classroom Instruction	1	3		
Fire Protection Design	◦Document Transfer ◦Classroom Instruction	3	3		
Equipment Qualification(SQ)	◦Document Transfer ◦Classroom Instruction	2	3		
Construction Management	◦Document Transfer ◦Classroom Instruction	4	1		
Cost Engineering	◦Document Transfer ◦Classroom Instruction	4	1		
Schedule Management	◦Document Transfer ◦Classroom Instruction	4	1		
Total					

Grade/ Category Code	Job Description	* No. of Personnel	* Average Hourly Rate	Remarks
Total				

\* This format is prepared to review the Bidder's actual average salary rate. Accordingly, this format shall be filled out based on actual number of personnel and actual hourly rate of each employee not company salary structure or rate schedule in Bidder's salary administration policy.

1. PROPOSED POSITION

(Task Title)

2. NAME

3. DATE OF BIRTH

4. NATIONALITY

5. EDUCATION

6. OTHER TRAINING

7. LANGUAGE & DEGREE OF PROFICIENCY

8. MEMBERSHIP OF PROFESSIONAL SOCIETIES

9. EMPLOYMENT RECORD

10. DETAILED TASKS ASSIGNED IN THIS PROJECT

11. COUNTRIES OF WORK EXPERIENCES

(Describe the period, project, client company, etc, in case of experience in Korea)



## **APPENDIX G**

### **Training for KHNP Personnel**

## 1. Training Objective

The objective of this training program is to provide KHNP personnel involved in the SHN 3&4 nuclear power plant project with the advanced knowledge, capability, and experience required for Mechanical Design, Piping Design, Nuclear Design, Station Power System Design, Protection Relay Coordination Design, Fire Protection Design, Equipment Qualification(Seismic Qualification), Construction Management, Cost Engineering and Schedule Management.

## 2. Training Place

The Consultant's head office or Consultant's designated location approved by KEPCO-E&C.

## 3. Approach to Technology Transfer

The technology transfer program for the training of KHNP personnel consists of three elements, each serving an essential part of the training process. These elements consist of (1) transfer of documents or tools such as computer software, standards, and text; (2) formal classroom training in specific subject matter tailored to the needs of the trainee; and (3) on-the job training including if necessary plant visits to discuss various methodologies and tools used by each course of training.

### 3.1 Transfer of Documents

A text of each of the training modules shall be prepared by the course instructor specifically for this course. Each text is expected to contain pertinent information and reference documents as required which the KHNP trainees can readily comprehend. Use of the computer software for training will be provided by Consultant, if necessary. Provision of software for use by KHNP is not included with the training.

### 3.2 Classroom Training

Classroom training will be provided for each course by Consultant's staff based on the course outline and the text provided under the document transfer. The instructors shall be experienced in teaching and in application of the subject matter. Depending on the content of the course, there may be one or multiple instructors for a course. Due to the small number of trainees for each course, the classroom training should be relatively

informal with an emphasis on interaction between the instructor and the trainees. Classroom training may be interspersed with plant visits to supplement the material taught in the classroom training. The number of classroom training hours will vary depending on the subject and the experience of the trainees.

### 3.3 On-The-Job-Training

Depending on the availability of work in the Consultant's office, and in accordance with the requirements of U.S. law, the trainees will be assigned to applicable tasks on actual new or backfit projects, or will be assigned to complete tasks which have been required previously on actual projects. KEPCO E&C shall be responsible for ensuring that all trainees have met all requirements for entry into the United States, including any applicable visa requirements.

## 4. Qualification of Trainees

- Education: Minimum B.S. degree or equivalent
- Experience: More than 5 years experience in nuclear power plant construction and/or engineering management
- Degree of Proficiency in English: Able to speak, read, and write

## 5. Training Schedule

4.1 The trainees will be collectively dispatched to Consultant's office in conjunction with the training schedule as shown on Table G-1

4.2. The schedule may be subject to change at KEPCO E&C's discretion and as mutually agreed. Actual training start date will be confirmed by KEPCO E&C's notification per Paragraph 6.1.

## 6. Compensation for Training Services

The training cost shown in Article 4.1 of section 1 in Chapter III in this Agreement is a base price to cover all the associated costs as described in Paragraph 5.1 below and is

subject to the conditions described in Paragraph 5.2 and 5.3

## 6.1 Base Price

The base price consists of Document Transfer Cost and Classroom Instruction Cost.

The document Transfer Cost includes the cost of preparation, maintenance, and distribution of each course manual, and is based on a rate of \$\_\_\_\_\_ for each of the ten (10) course manual.

The classroom instruction cost includes the instructor's labor cost and any other supporting personnel's labor cost. The contact time for the instructors is assumed to be six (6) hours for each day over the entire duration of each course.

The cost for administrative support and overhead is included in the base price.

Consultant shall also provide arrangement and payment for local transportation between airport and trainee's housing at the beginning of training course.

The cost of the travel of the trainees to and from the US and their living expenses shall be borne by KHNP and KEPCO E&C will ensure that KHNP is responsible. This cost is not included in the base price. However, Consultant shall provide general assistance in locating housing and living in Consultant's office for the trainees.

## 6.2 Payment Schedule

Payment for each training course listed in Figure G-1 shall be in accordance with the following schedule:

<u>Activities</u>	<u>Payment % of Total Price (for each course)</u>
Delivery of Course Books-----	%
After 1 month of course start-----	%
Course Completion-----	%

## 6.3 Method of Payment

The invoice for the training on each course conducted in accordance with Paragraph 5.2 shall be submitted in accordance with Article 5.2 of section 1 in Chapter III in this Agreement.

## 6.4 Adjustment for price

In the event that any of courses shown in Figure G-1 will be either extended or reduced or additional personnel is included in the training, at the request of KEPCO E&C, the costs of classroom instruction will be adjusted within the agreement amount and, if necessary in accordance with Article 7, "REVISIONS" of the Agreement to authorize additional funds.

### 6.4.1 Document Transfer Cost

The document transfer cost shall be determined based on a rate of \$\_\_\_\_\_ for each course only in the case that the complete sets have been delivered to-KEPCO E&C.

### 6.4.2 Classroom Instruction Cost

If the training duration is extended by KEPCO E&C, Classroom Instruction Cost will be calculated at a rate of \$\_\_\_\_\_ per man-hour based on actual duration conducted. If the training duration is reduced, the Classroom Instruction Cost shall be prorated based on this same process.

6.4.3 In case trainees are not able to perform the training due to problems with health, accident, and personal items, an equitable refund for the costs expended by KEPCO E&C or Consultant shall be made as mutually agreed.

6.4.4 Addition of trainees to an existing course shall not affect the training cost. Significant changes in the overall program would be assessed in accordance with the Agreement.

## 7. Procedure for Implementing Training

7.1 KEPCO E&C shall issue a "Release to Start" as an authorization to Consultant at least three (3) months prior to the desired date for start of each training course. The "Release to Start" will authorize Consultant to plan the training and to start preparation of training documents including the course manual. After receipt of "Release to Start," Consultant shall promptly provide KEPCO E&C a resume for instructor for KEPCO E&C's review and concurrence.

Two (2) months prior to actual start of each training topic, Consultant shall submit a "Detailed Training Program." One (1) month prior to the actual start of each training course, Consultant shall submit a draft of the training course text to KEPCO E&C.

Two (2) weeks prior to actual start of each training course, Consultant shall incorporate comments and finalize the "Detailed Training Program." The finalized program and manual shall be provided to the trainee(s) upon arrival at Consultant's designated training location, and a complete set of training program and manual shall also be sent to KEPCO E&C.

7.2 Consultant or its representative shall meet the trainee(s) at the designated airport and transport them to their housing (or temporary lodging if housing is not available).

7.3 Consultant shall assign a instructor (or more) formally, and shall provide an orientation to help familiarize the trainee(s) with living conditions in the area, transportation, communication, mailing, shopping, and contacts to the Korean Embassy, etc.

Consultant shall also assign a Manager of Training Program and a Program Administrative. The manager shall interface with KHNP management and be responsible for overall direction of the training effort.

## 8. Standard for Training Services

To derive fruitful results of training, Consultant shall utilize its all in-house or external resources as required and/or helpful for the training. To determine whether or not the training has been fruitful to the level prescribed prior to commencement of the training, periodic and final evaluation of the training progress shall be made jointly by KEPCO E&C and Consultant.

If the evaluation results show unsatisfactory implementation of the training, Consultant shall re-perform deficient areas of the training to the degree as agreed upon by both parties.

Any other contractual conditions and requirements for the training services not specifically in this Appendix shall be discussed and so agreed between KEPCO E&C and Consultant when necessary.

## 9. Others

All contractual rights and obligation for the training services shall be performed as reflected in the Agreement.

Figure G-1 KHNP Personnel Training Schedule

Courses	Number of Trainees	Period (Months)	Schedule (tentative)
Mechanical Design	1	3	'24.09.01 ~ '24.11.30
Piping Design	2	3	'24.09.01 ~ '24.11.30
Nuclear Design (including severe accident mitigation design)	2	3	'24.09.01 ~ '24.11.30
Station Power System Design	2	3	'24.09.01 ~ '24.11.30
Protection Relay Coordination Design	1	3	'24.09.01 ~ '24.11.30
Fire Protection Design	3	3	'24.09.01 ~ '24.11.30
Equipment Qualification (Seismic Qualification)	2	3	'24.09.01 ~ '24.11.30
Construction Management	4	1	'24.09.01 ~ '24.09.30
Cost Engineering	4	1	'24.09.01 ~ '24.09.30
Schedule Management	4	1	'24.09.01 ~ '24.09.30

Note 1. Training Courses, Number of Trainees, and Period can be adjusted in accordance with KHNP's Training Plan.

2. All training and services under this program will be provided on a reimbursable scope of work basis.