



**KHNP**  
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September 30, 2013  
Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Attention: Glenn M. Tracy  
Director, Office of New Reactors

10 CFR § 52.45  
Project No.0782  
MKD/NW-13-0029L

**Subject: Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd Application for Design Certification of the APR1400 Standard Plant Design**

Korea Electric Power Corporation (KEPCO) and Korea Hydro & Nuclear Power Co., Ltd (KHNP) are pleased to submit to the U.S. Nuclear Regulatory Commission (Commission) its Application for the Certification of the APR1400 Standard Plant Design (Application). The Application provides the information required by Subpart B of 10 CFR Part 52 for the certification of the APR1400 standard plant design.

The following general information is provided in accordance with 10 CFR § 52.46 and 10 CFR § 50.33 (a) through (c):

- (a) Name of applicants: Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd
- (b) Address of applicants:
  - KEPCO - 512, Yeongdong-daero, Gangnam-Gu, Seoul, KOREA 135-791
  - KHNP - 520, Yeongdong-daero, Gangnam-Gu, Seoul, KOREA 135-881
- (c) Description of business or occupation of applicants:
  - KEPCO - KEPCO was founded with the objective to facilitate the development of electric power supply in Korea, meet the country's power supply and demands needs, and contribute to the national economy in accordance with the Korea Electric Power Corporation Act. KEPCO is classified as a market-oriented public corporation under the Act on the Management of Public Institutions. KEPCO's areas of business are based on the aforementioned objectives and include the development of electric power resources, electric power generation, transmission, transformation, and distribution, as well as related marketing, research, technological development,

overseas business, investment, corporate social responsibility and use of its property. KEPCO funds APR1400 design certification activities and provides input and directions for top-level policy issues for the design certification.

- KHNP - KHNP is one of the six power generating companies in Korea, accounting for approximately 25% of electricity producing facilities, hydro and nuclear combined. KHNP operates 23 nuclear power plants and is constructing five nuclear power plants. KHNP provides approximately 30% of the national power supply. KHNP is a wholly-owned subsidiary of KEPCO. KHNP is responsible for all technical and administrative issues related to the APR1400 design certification, including quality assurance. KHNP is the lead applicant for the APR1400 design certification.

The Application does not include any Restricted Data or other defense information requiring separation in accordance with 10 CFR § 50.33(j).

This Application is submitted under oath or affirmation of the undersigned as duly authorized by KEPCO and KHNP, as provided in Enclosure 1. The Application consists of the above general information and the following documents being submitted simultaneously with this letter:

1. The Design Control Document for the APR1400 (DCD). The APR1400 is an evolutionary change from light-water reactor designs of plants that have been licensed and in commercial operation before April 18, 1989. In accordance with 10 CFR § 52.47(c)(1), the DCD provides an essentially complete nuclear power plant design except for site-specific elements such as the service water intake structure and the ultimate heat sink. The DCD was prepared following the guidance of NUREG-0800 and Regulatory Guide 1.206.
  - Tier 2 of the DCD provides the final safety analysis report (FSAR) for the APR1400 standard plant design required by 10 CFR § 52.47(a). The FSAR describes the standard facility, presents the design bases and the limits on its operation, and presents a safety analysis of the structures, systems, and components of the standard facility as a whole.
  - The DCD is being submitted electronically on compact discs (CDs) in two versions: The first version (in CD 1) includes certain information, designated pursuant to Commission guidance as sensitive unclassified non-safeguards information, referred to as security-related information (SRI), that is to be withheld from public disclosure under 10 CFR § 2.390. The second version (in CD 2) omits the SRI and is suitable for public disclosure.
  - In accordance with 10 CFR § 52.47(b)(1), the DCD includes Tier 1 – the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a facility that incorporates the certified design has been constructed and will be operated in conformity with the design certification, the provisions of the Atomic Energy Act, and the Commission's rules and regulations.
2. Applicant's Environmental Report – Standard Design Certification, submitted in

accordance with 10 CFR § 52.47(b)(2). The Environmental Report is being submitted electronically on the compact discs with the DCD.

3. Technical Reports that contain analyses and other information that supplement the materials included in the DCD and are incorporated by reference therein. Each of individual technical reports is being submitted electronically on a compact disc. Enclosure 2 hereto is the APR1400 reports submittal plan. This plan lists the above technical reports as well as additional technical reports that will be provided at a future date in support of the application.

KHNP has had eleven (11) pre-application review meetings and a pre-application audit since April 2010. Based on the feedback from the audit and the review meetings, KHNP has worked diligently on the DCD to improve the completeness by enhancing the level of detail and consistency.

Enclosure 3 contains the APR1400 approach for Design Acceptance Criteria (DAC)-ITAAC.

KHNP looks forward to interacting with the NRC in its technical review of the Application for design certification of the APR1400 and promptly providing any additional information necessary for the successful completion of the NRC's review. Please contact Dr. Myung-Ki Kim, Project Manager, Korea Hydro & Nuclear Power Co., Ltd, if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,



Byung-Oke Cho  
Executive Vice President  
Korea Hydro and Nuclear Power Co., Ltd  
512 Yeongdong-Daero, Gangnam-Gu, Seoul 135-791, Korea

Contact Information

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Enclosures:

1. Oath or Affirmation
2. APR1400 Reports Submittal Plan
3. APR1400 Approach for DAC-ITAAC

ENCLOSURE 1  
OATH OR AFFIRMATION

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of

KOREA ELECTRIC POWER CORPORATION and KOREA HYDRO & NUCLEAR POWER  
CO., LTD

Advanced Power Reactor 1400

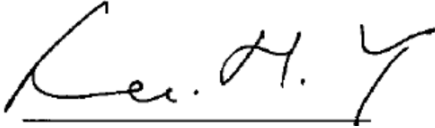
Standard Plant Design Certification Application

**AFFIDAVIT OF HEE-YONG LEE**

I, Hee-Yong Lee, being duly authorized, state the following:

1. I am Executive Vice President of KOREA ELECTRIC POWER CORPORATION (KEPCO).
2. I am authorized to sign and file with the United States Nuclear Regulatory Commission, on behalf of KEPCO, the enclosed Application for Certification of the Advanced Power Reactor 1400 (APR1400) Standard Plant Design.
3. On behalf of KEPCO I state that KEPCO funds the APR1400 design certification activities and provides input and directions for top-level policy issues for the design certification. KEPCO recognizes and agrees that KHNP is responsible for all technical and administrative issues related to the APR1400 design certification, including quality assurance.
4. I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 30th day of September, 2013

  
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Hee-Yong Lee

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of

KOREA ELECTRIC POWER CORPORATION and KOREA HYDRO & NUCLEAR POWER  
CO., LTD

Advanced Power Reactor 1400

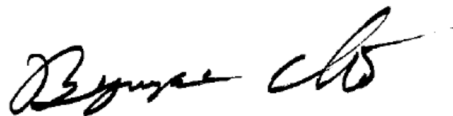
Standard Plant Design Certification Application

**AFFIDAVIT OF BYUNG-OKE CHO**

I, Byung-Oke Cho, being duly authorized, state the following:

1. I am Executive Vice President of KOREA HYDRO & NUCLEAR POWER CO., LTD (KHNP).
2. I am authorized to sign and file with the United States Nuclear Regulatory Commission, on behalf of KHNP, the enclosed Application for Certification of the Advanced Power Reactor 1400 (APR1400) Standard Plant Design (Application).
3. On behalf of KHNP I state that KHNP is responsible for all technical material, including the design, for the Application for the APR1400 design certification.
4. I declare under penalty of perjury that all the statements made in the Application, including the Design Control Document, the Environmental Report, and Technical Reports, are true and correct to the best of my knowledge, information and belief.

Executed on this 30th day of September, 2013



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Byung-Oke Cho

ENCLOSURE 2  
APR1400 Reports Submittal Plan

**APR1400 Reports Submittal Plan**

| <b><u>DCD Chapter</u></b> | <b><u>KHNP Report No.</u></b>                     | <b><u>KHNP Report Name</u></b>  | <b><u>Supports DCD Chapter</u></b>      | <b><u>Revision</u></b> | <b><u>Submitted Dates</u></b> |
|---------------------------|---|---|---|------------------------|-------------------------------|
| 3                         | APR1400-Z-M-NR-13011-P<br>APR1400-Z-M-NR-13011-NP | Comprehensive Vibration Assessment Program for APR1400 Reactor Internals                                | 3.9.2.4                                 | 0                      | 06/30/2014<br>(Target Date)   |
| 3                         | APR1400-Z-M-NR-13012-P<br>APR1400-Z-M-NR-13012-NP | Structural Analysis of Fuel Assemblies for Seismic and Loss of Coolant Accident Loading for the APR1400 | 3.9.2.5                                 | 0                      | 06/30/2014<br>(Target Date)   |
| 3                         | APR1400-E-S-NR-13001-P<br>APR1400-E-S-NR-13001-NP | Seismic Design Bases for the APR1400 Standard Plant Design  | 3.7.1.1.2<br>3.7.1.3                    | 0                      | 09/30/2013                    |
| 3                         | APR1400-E-S-NR-13002-P<br>APR1400-E-S-NR-13002-NP | Finite Element Seismic Models for SSI Analyses of the NI buildings of the APR1400 Standard Plant        | 3.7.2.3.3.1                             | 0                      | 09/30/2013                    |
| 3                         | APR1400-E-S-NR-13003-P<br>APR1400-E-S-NR-13003-NP | SSI Analysis Methodology and Results of NI Buildings of the APR1400 Standard Plant                      | 3.7.2.9                                 | 0                      | 09/30/2013                    |
| 3                         | APR1400-E-S-NR-13004-P<br>APR1400-E-S-NR-13004-NP | Evaluation of Effects of HRHF Response Spectra on SSCs of the APR1400 Standard Plant                    | 3.7B.1                                  | 0                      | 09/30/2013                    |
| 3                         | APR1400-E-S-NR-13005-P<br>APR1400-E-S-NR-13005-NP | Evaluation of Structure-Soil-Structure Interaction (SSSI) Effects of the APR1400 Standard Plant         | 3.7.2.8                                 | 0                      | 09/30/2013                    |
| 3                         | APR1400-E-S-NR-13006-P<br>APR1400-E-S-NR-13006-NP | Stability Check for NI Common Basemat   | 3.8.5.4.3                               | 0                      | 09/30/2013                    |
| 3                         | APR1400-E-E-NR-12001-P<br>APR1400-E-E-NR-12001-NP | Equipment Qualification Program   | 3.11                                    | 0                      | 09/30/2013                    |
| 3                         | APR1400-H-N-NR-13003-P<br>APR1400-H-N-NR-13003-NP | Structural/Seismic Analysis of New and Spent Fuel Storage Racks for the APR1400                         | 3.8.4                                   | 0                      | 10/31/2013<br>(Target Date)   |
| 5                         | APR1400-Z-M-NR-13010-P<br>APR1400-Z-M-NR-13010-NP | Pressure-Temperature Limits Methodology for RCS Heat-up and Cooldown                                    | 5.2, 5.3                                | 0                      | 09/30/2013                    |
| 5                         | APR1400-Z-M-TR-13015-P<br>APR1400-Z-M-TR-13015-NP | RCP Flywheel Integrity  | 5.4.1.1                                 | 0                      | 12/31/2014<br>(Target Date)   |
| 6                         | APR1400-Z-A-NR-13007-P<br>APR1400-Z-A-NR-13007-NP | LOCA Mass and Energy Release Methodology  | 6.2.1.3                                 | 0                      | 09/30/2013                    |
| 6                         | APR1400-E-N-NR-13001-P<br>APR1400-E-N-NR-13001-NP | APR1400 Design Features to Address GSI-191  | 6.2.1.1.2.2<br>6.8.2.2.1                | 0                      | 10/31/2013<br>(Target Date)   |
| 6                         | APR1400-E-N-NR-13002-P<br>APR1400-E-N-NR-13002-NP | IRWST Sump Strainer and Trash Rack Structural Analysis Report   | —                                       | 0                      | 1/31/2014<br>(Target Date)    |
| 7                         | APR1400-Z-J-EC-13001-P<br>APR1400-Z-J-EC-13001-NP | Safety I&C System   | 7.1, 7.2,<br>7.3, 7.4,<br>7.5, 7.8, 7.9 | 0                      | 09/30/2013                    |



**APR1400 Reports Submittal Plan**

| <b><u>DCD Chapter</u></b> | <b><u>KHNP Report No.</u></b>                     | <b><u>KHNP Report Name</u></b>   | <b><u>Supports DCD Chapter</u></b> | <b><u>Revision</u></b> | <b><u>Submitted Dates</u></b> |
|---------------------------|---|--|------------------------------------|------------------------|-------------------------------|
| 7                         | APR1400-Z-J-EC-13002-P<br>APR1400-Z-J-EC-13002-NP | Diversity and Defense-in-Depth   | 7.2, 7.3,<br>7.7, 7.8              | 0                      | 03/08/2013                    |
|                           |   |  |                                    | 1                      | 09/30/2013                    |
| 7                         | APR1400-Z-J-NR-13003-P<br>APR1400-Z-J-NR-13003-NP | Software Program Manual  | 7.1.4,<br>7.2.2.2,<br>7.3.1        | 0                      | 09/30/2013                    |
| 7                         | APR1400-Z-J-NR-13004-P<br>APR1400-Z-J-NR-13004-NP | Uncertainty Methodology and Application for Instrumentation                          | 7.2.2.7,<br>7.3.2.7                | 0                      | 09/30/2013                    |
| 7                         | APR1400-Z-J-NR-13005-P<br>APR1400-Z-J-NR-13005-NP | Setpoint Methodology for Plant Protection System                                     | 7.2.2.7,<br>7.3.2.7                | 0                      | 09/30/2013                    |
| 7                         | APR1400-Z-A-NR-13008-P<br>APR1400-Z-A-NR-13008-NP | CCF Coping Analysis  | 7.7.2.8,<br>7.8                    | 0                      | 09/30/2013                    |
| 7                         | APR1400-E-J-NR-13001-P<br>APR1400-E-J-NR-13001-NP | Component Interface Module   | 7.3.2.4                            | 0                      | 09/30/2013                    |
| 8                         | APR1400-E-E-NR-12002-P<br>APR1400-E-E-NR-12002-NP | Onsite AC Power System Analysis  | 8.3                                | 0                      | 12/31/2013<br>(Target Date)   |
| 9                         | APR1400-Z-A-NR-13013-P<br>APR1400-Z-A-NR-13013-NP | Criticality Analysis for New and Spent Fuel Storage Racks                            | 9.1                                | 0                      | 06/30/2014<br>(Target Date)   |
| 13                        | APR1400-E-A-NR-13001-P<br>APR1400-E-A-NR-13001-NP | Physical Security  | 13.6<br>13.6.2<br>13.6.3           | 0                      | 06/30/2014<br>(Target Date)   |
| 15                        | ARP1400-F-A-NR-12002-P<br>ARP1400-F-A-NR-12002-NP | Post-LOCA Long Term Cooling Evaluation Model   | 15.6                               | 0                      | 10/07/2013<br>(Target Date)   |
| 15                        | ARP1400-F-A-NR-12003-P<br>ARP1400-F-A-NR-12003-NP | Small Break LOCA Evaluation Model  | 15.6                               | 0                      | 10/07/2013<br>(Target Date)   |
| 15                        | APR1400-F-A-NR-13002-P<br>APR1400-F-A-NR-13002-NP | The Effect of Thermal Conductivity Degradation on APR1400 Design and Safety Analyses | 15.4<br>15.6                       | 0                      | 10/31/2013<br>(Target Date)   |
| 15                        | APR1400-Z-A-NR-13006-P<br>APR1400-Z-A-NR-13006-NP | Non-LOCA Safety Analysis Methodology   | 15.0.2                             | 0                      | 09/30/2013                    |
| 16                        | APR1400-K-O-NR-13001-NP                           | Deviation Report between NUREG-1432 Rev. 4.0 and APR1400 Technical Specifications    | -                                  | 0                      | 10/31/2013<br>(Target Date)   |
| 18                        | APR1400-E-J-NR-12001-P<br>APR1400-E-J-NR-12001-NP | FRA/FA Implementation Plan   | 18.3.2                             | 0                      | 09/30/2013                    |

**APR1400 Reports Submittal Plan**

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|-------------------------------|---|---|--|------------------------|-----------------------------------|
| 18                            | APR1400-E-J-NR-12002-P<br>APR1400-E-J-NR-12002-NP | Human Factor Engineering Program Plan                   | 18.1.1                                     | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-12003-P<br>APR1400-E-J-NR-12003-NP | Operating Experience Review Implementation Plan         | 18.2.2                                     | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-12004-P<br>APR1400-E-J-NR-12004-NP | Operating Experience Review Report                      | —  | 0                      | 09/30/2015<br>(Target Date)       |
| 18                            | APR1400-E-J-NR-12005-P<br>APR1400-E-J-NR-12005-NP | Style Guideline   | 18.7.2                                     | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-12006-P<br>APR1400-E-J-NR-12006-NP | FRA/FA Report   | —  | 0                      | 09/30/2015<br>(Target Date)       |
| 18                            | APR1400-E-J-NR-12007-P<br>APR1400-E-J-NR-12007-NP | Task Analysis Implementation Plan                       | 18.4.1                                     | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-12008-P<br>APR1400-E-J-NR-12008-NP | HSI Design Implementation Plan                          | 18.7.2                                     | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-12009-P<br>APR1400-E-J-NR-12009-NP | Basic HSI Platform                                      | —  | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-12010-P<br>APR1400-E-J-NR-12010-NP | HF V&V Implementation Plan                              | 18.10.1<br>18.10.2                         | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-13003-P<br>APR1400-E-J-NR-13003-NP | Treatment of Important Human Action Implementation Plan | 18.6.2                                     | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-13002-P<br>APR1400-E-J-NR-13002-NP | HF V&V Scenarios  | 18.10.2                                    | 0                      | 09/30/2013                        |
| 18                            | APR1400-K-J-NR-13001-P<br>APR1400-K-J-NR-13001-NP | Staffing and Qualifications Implementation Plan         | 18.5                                       | 0                      | 09/30/2013                        |
| 18                            | APR1400-K-J-NR-13002-P<br>APR1400-K-J-NR-13002-NP | Design Implementation Plan                              | 18.11                                      | 0                      | 09/30/2013                        |
| 18                            | APR1400-K-J-NR-13003-P<br>APR1400-K-J-NR-13003-NP | Human Performance Monitoring Implementation Plan        | 18.12                                      | 0                      | 09/30/2013                        |
| 18                            | APR1400-E-J-NR-15001-P<br>APR1400-E-J-NR-15001-NP | Task Analysis Report                                    | 18.4                                       | 0                      | 09/30/2015<br>(Target Date)       |
| 18                            | APR1400-E-J-NR-15002-P<br>APR1400-E-J-NR-15002-NP | Treatment of Important Human Action Report              | 18.6                                       | 0                      | 09/30/2015<br>(Target Date)       |

**APR1400 Reports Submittal Plan**

| <u><b>DCD<br/>Chapter</b></u> | <u><b>KHNP Report No.</b></u>                     | <u><b>KHNP Report Name</b></u>  | <u><b>Supports<br/>DCD<br/>Chapter</b></u> | <u><b>Revision</b></u> | <u><b>Submitted<br/>Dates</b></u> |
|-------------------------------|---|---------------------------------|--|------------------------|-----------------------------------|
| 19                            | APR1400-Z-M-TR-13014-P<br>APR1400-Z-M-TR-13014-NP | RCP Seal Leakage                | 19.1.4.1                                   | 0                      | 12/31/2014<br>(Target Date)       |
| 19                            | APR1400-E-P-NR-13003-P<br>APR1400-E-P-NR-13003-NP | Severe Accident Analysis Report | 19.2.3.3.2.3                               | 0                      | 10/07/2013<br>(Target Date)       |
| 19                            | APR1400-E-P-NR-13002-P<br>APR1400-E-P-NR-13002-NP | Aircraft Impact Analysis Report | —  | 0                      | 03/31/2014<br>(Target Date)       |

ENCLOSURE 3  
APR1400 Approach for DAC-ITAAC

**APR1400 Approach for DAC-ITAAC**

| Areas                 | Use of DAC                  |                               |                 | DCD at Submittal |        |              | Remark                      |
|-----------------------|-----------------------------|-------------------------------|-----------------|------------------|--------|--------------|-----------------------------|
|                       |                             |                               |                 | DAC              | ITAAC  |              |                             |
|                       |                             |                               |                 |                  | Design | Construction |                             |
| Components and Piping | ASME Class CS               | Reactor Internals             | Stress Analyses | -                | x      | x            | Primary Stress Calculated   |
|                       | ASME Class 1                | Reactor Vessels               |                 | -                | x      | x            | Primary Stress Calculated   |
|                       |                             | Steam Generator               |                 | -                | x      | x            | Primary Stress Calculated   |
|                       |                             | Pressurizer                   |                 | -                | x      | x            | Primary Stress Calculated   |
|                       |                             | Reactor Coolant Pump          |                 | x                | x      | x            | -                           |
|                       |                             | CRDM                          |                 | -                | x      | x            | Primary Stress Calculated   |
|                       |                             | Reactor Coolant Loop Piping   |                 | -                | x      | x            | Primary Stress Calculated   |
|                       |                             | RCL Branch Piping             |                 | x                | x      | x            | Sample Calculation Prepared |
|                       |                             | Pressurizer Surge Line Piping |                 | -                | x      | x            | Primary Stress Calculated   |
|                       | ASME Class 2&3              | Piping                        |                 | x                | x      | x            | Sample Calculation Prepared |
| I&C                   | Software Life Cycle Process |                               |                 | x                | x      | x            | -                           |
| HFE                   | HFE Implementation Plans    |                               |                 | x                | x      | x            | -                           |