

April 8, 2016

Dr. Jae Yong Lee, Project Manager
APR1400 Design Certification
Advanced Reactors Development Laboratory
Korea Hydro and Nuclear Power Co., Ltd.
70-1312-gil, Yuseong-daero, Yuseong-Gu
Daejeon 305-343 Korea (Republic of)

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION OF KOREA HYDRO &
NUCLEAR POWER CO., LTD., REPORT NO. 05200046/2016-201

Dear Dr. Jae Yong Lee:

On February 29 through March 4, 2016, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection of Korea Hydro & Nuclear Power Co (KHNP) at the Westinghouse Electric Company facility in Rockville, Maryland. The purpose of this limited scope inspection was to assess KHNP's implementation of applicable requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

This inspection assessed aspects of KHNP's design and quality assurance (QA) activities, which included the corrective action, oversight of contracted activities, and 10 CFR Part 21 programs associated with the control of software codes RELAP5/MOD3.3/K, CESEC-III and CETOP-D, used for the APR1400 Design Certification application. The enclosed report presents the results of this inspection. This NRC inspection report does not constitute an NRC endorsement of KHNP's QA and 10 CFR Part 21 programs.

Within the scope of this inspection, no violations were identified.

In accordance with 10 CFR 2.390, "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure(s), and your response (if applicable) will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agency wide Documents Access and Management System (ADAMS), accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response (if provided) should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or

financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/ (JHeath for)

Kerri Kavanagh, Chief
Quality Vendor Inspection Branch-3
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 05200046

Enclosure:
Inspection Report No. 05200046/2016-201
and Attachment

financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/ (JHeath for)

Kerri Kavanagh, Chief
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 and Attachment

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NRO-002

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OFFICE	NRO/DSRA/SRSB	NRO/DSRA/SRSB	NRO/DCIP/QVIB-3	
NAME	JGilmer	MThomas*	KKavanagh (JHeath for)	
DATE	03/30/16	04/04/16	04/08/16	

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**U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF CONSTRUCTION INSPECTION AND
OPERATIONAL PROGRAMS**

Docket No.: 05200046

Report No.: 05200046/2016-201

Applicant: Korea Hydro & Nuclear Power Co., Ltd. (KHNP)
70-1312-GIL Yuseong-Daero, Yuseong-Gu
Daejeon, 305-343, Korea

Applicant Contact: Dr. Jae Yong Lee
+82-42-870-5400
leejaeyong@khnp.co.kr

Nuclear Industry Activity: KHNP submitted its Design Certification (DC) application for the
APR1400 in December 2014.

Inspection Dates: February 29, 2016 to March 4, 2016

Inspection Team: Aaron Armstrong NRO/DCIP/QVIB-1, Team Leader
George Lipscomb NRO/DCIP/QVIB-1
Ashley Thomas NRO/DCIP/QVIB-3
Tim Drzewiecki NRO/DSRA/SRSB
James Gilmer NRO/DSRA/SRSB
Matt Thomas NRO/DSRA/SRSB

Approved by: Kerri Kavanagh, Branch Chief
Quality Assurance Vendor Branch-3
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Enclosure

EXECUTIVE SUMMARY

Korea Hydro & Nuclear Power Co., Ltd.
0520046/2016-201

The U.S. Nuclear Regulatory Commission (NRC) conducted this Design Certification (DC) inspection to verify that, Korea Hydro & Nuclear Power Co., Ltd. (hereafter referred to as KHNP), implemented an adequate quality assurance (QA) program in compliance with the applicable requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and 10 CFR Part 21, "Reporting of Defects and Noncompliance." The inspection team conducted the inspection at the Westinghouse Electric Company (WEC) facility in Rockville, Maryland.

This technically focused inspection evaluated KHNP's implementation of quality activities associated with the use of software codes RELAP5/MOD3.3/K, CESEC-III, and CETOP-D, for the Chapter 15, "Transient and Accident Analysis" and the Chapter 4, "Reactor" safety analyses of the APR1400 DC application. Since KHNP contracted the design analysis activities to KEPCO Engineering & Construction (KEPCO-E&C (SD)), KEPCO Nuclear Fuel (KEPCO-NF) and Doosan Heavy Industries, this inspection focused on KHNP's oversight of these activities.

The following regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21

During the planning and course of this inspection, the NRC inspection team followed Inspection Procedure (IP) 35034, "Design Certification Testing Inspection," IP 35017, "Quality Assurance Implementation Inspection," and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Nonconformance."

The information below summarizes the results of this inspection.

10 CFR Part 21 Program

The NRC inspection team determined that for the sample evaluated, the implementation of KHNP's 10 CFR Part 21 program is consistent with the regulatory requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance." No findings of significance were identified.

Oversight of Contracted Activities

The NRC inspection team determined that for the sample evaluated, the implementation of KHNP's programs for oversight of contracted activities is consistent with the regulatory requirements of Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

Design Control

The NRC inspection team determined that for the sample evaluated, the implementation of the supplier design controls approved by KHNP for the use of software codes RELAP5/MOD3.3/K, CESEC-III, and CETOP is consistent with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

Corrective Action

The NRC inspection team determined that for the sample evaluated, the implementation of KHNP's corrective action program is consistent with the regulatory requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

REPORT DETAILS

1. 10 CFR Part 21 Program

a. Scope

The NRC inspection team reviewed KHNP, KEPCO-E&C (SD) and KEPCO-NF QA manuals, policies, and procedures that govern the evaluation program to determine compliance with 10 CFR Part 21. The inspection team verified that KHNP's nonconformance and corrective action processes provide adequate links to the Part 21 procedure. The NRC inspection team reviewed KEPCO-E&C (SD)'s and KEPCO-NF's procedures and corrective action program to verify an adequate identification of conditions that could require 10 CFR Part 21 evaluation, and to ensure the transfer of the responsibility for evaluation to KHNP.

The NRC inspection team discussed the Part 21 process with KHNP personnel to assess their understanding of Part 21, and how they would identify conditions that could require 10 CFR Part 21 evaluation.

The documents reviewed by the NRC inspection team are included in the attachment to this inspection report.

b. Finding and Observations

There were no Part 21 evaluations completed at the time of inspection. No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that for the sample evaluated, the implementation of KHNP's 10 CFR Part 21 program is consistent with the regulatory requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance." No findings of significance were identified.

2. Oversight of Contracted Activities

a. Scope

The NRC inspection team reviewed KHNP's policies and implementing procedures that govern the implementation of its oversight of contracted activities to verify compliance with the requirements of Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team evaluated implementation of QA processes associated with oversight of contracted safety-related activities.

The NRC inspection team selected a procurement sample to evaluate KHNP qualification of suppliers and specification of requirements in KHNP contracts for safety-related activities. The sample included contracts with KEPCO-NF, KEPCO-E&C (SD) and Doosan Heavy Industries. The contracts supported both the KHNP application pre-submittal to the NRC for the APR1400 standard Design Certification (DC) and the resolution of NRC questions relating to the application after submittal.

Furthermore, the NRC inspection team selected a sample of delivered supplier documentation to evaluate the KHNP receipt, review, and acceptance processes. The sample included accident analyses associated with large break loss of coolant accident (LOCA) and steam line break. The NRC inspection team also evaluated qualification of KHNP personnel involved with these acceptance processes.

The NRC inspection team reviewed KHNP's procedure for performing QA audits of suppliers and their standard checklist. The NRC inspection team assessed the implementation of KHNP's audit program by reviewing a sample of audits, specifically, the NRC inspection team reviewed KHNP's audits of KEPCO-NF performed in 2013, 2015, and 2016. The NRC inspection team also reviewed KHNP's audits of KEPCO-E&C (SD) performed in 2013 and 2016. The NRC inspection team also reviewed the audit reports for objective evidence of KHNP's review of the implementation of QA criteria of Appendix B to 10 CFR Part 50 for internal KHNP activities. For any audits that resulted in findings, the NRC inspection team verified that KHNP initiated adequate corrective actions.

The documents reviewed by the NRC inspection team are included in the attachment to this inspection report.

b. Finding and Observations

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that for the sample evaluated, the implementation of KHNP's programs for oversight of contracted activities is consistent with the regulatory requirements of Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

3. Design Control

a. Scope

KHNP contracted with suppliers, KEPCO-E&C (SD) and KEPCO-NF, to perform safety-related design activities in support of the APR1400 DC application. These activities included the use of software codes RELAP5/MOD3.3/K, CESEC-III, and CETOP-D. The use of these software codes is controlled under the supplier's Appendix B to 10 CFR Part 50 QA program, however KHNP maintained responsibility for auditing and approving the supplier's QA program. The inspection team reviewed the implementation of the design controls for each of the aforementioned software codes.

CESEC-III

CESEC-III is a computer code developed by Combustion Engineering (CE) designed to calculate the thermal-hydraulic response of a CE-designed two-by-four loop nuclear steam supply system for anticipated operational occurrences and postulated events. CESEC-III was modified by KEPCO-E&C (SD) to model the chemical and volume control system (CVCS) pumps and pressurizer pilot operated safety relief valves (POSRVs) for the APR1400.

The NRC inspection team verified that the installation and testing of CESEC-III, as well documentation for code changes to CESEC-III for CVCS pumps and POSRV modeling were completed in accordance with the design computer code control procedure. The NRC inspection team also verified that the code modifications were completed by personnel with adequate training and qualifications.

The NRC inspection team evaluated the derivation of the cold-edge temperature used in steam line break analysis, the source code implementing the cold edge temperature in CESEC-III, and applicable design specifications affecting APR1400 safety analysis for consistency with the description provided in the KHNP technical report APR1400-Z-A-NR-14006, "Non-LOCA Safety Analysis Methodology."

Additionally, the NRC inspection team reviewed software verification and validation reports for installed versions on various computer platforms and operating systems.

CETOP-D

CETOP -D is a CE designed computer code that was derived and benchmarked against the TORC code to produce faster run times by utilizing a one-step calculation for core thermal margin in the hot sub-channel. CETOP-D code was used by KEPCO-NF to conduct non-LOCA Chapter 15, "Transient and Analysis" safety analysis and Chapter 4, "Reactor" core thermal design analyses for the APR1400 DC application. KEPCO-NF modified the code to implement the KCE-1 critical heat flux correlation for PLUS7 fuel.

The NRC inspection team verified that the installation and testing of CETOP-D, as well documentation for code changes to CETOP-D for implementing the KCE-1 critical heat flux correlation were completed in accordance with the computer software engineering procedure. The NRC inspection team also verified that the code modifications were completed by personnel with adequate training and qualifications.

In addition, the inspection team verified the thermal margin persevered by CETOP-D is conservative with respect to analyses performed with the TORC code.

RELAP5/MOD3.3/K

RELAP5/MOD3.3 is an NRC supported code developed jointly by the NRC and a consortium consisting of several countries and domestic organizations. RELAP5/MOD3.3 can be used for simulation of a wide variety of hydraulic and thermal transients. RELAP5/MOD3.3/K is a code derived from RELAP5/MOD3.3. RELAP5/MOD3.3/K is used by KEPCO-NF to perform large-break loss-of-coolant accident analyses as part of code-accuracy-based realistic evaluation methodology.

KEPCO-NF used and modified RELAP5/MOD3.3 to correct identified deficiencies in the code; implement bias and multiplier capabilities for the uncertainty input parameters (dial variables); and couple RELAP5/MOD3.3/K to CONTEMPT/MOD5, which models containment characteristics, to realistically model containment back-pressure. The NRC inspection team verified that these modifications were tested and documented in accordance with the computer software engineering procedure. The NRC inspection team also verified that the code modifications were completed by personnel with adequate training and qualifications.

The documents reviewed by the NRC inspection team are included in the attachment to this inspection report.

b. Finding and Observations

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that for the sample evaluated, the implementation of the supplier design controls approved by KHNP for the use of software codes RELAP5/MOD3.3/K, CESEC-III, and CETOP is consistent with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

4. Corrective Action

a. Scope

The NRC inspection team reviewed the policies and procedures governing the implementation of the KHNP's corrective action program to verify compliance with Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. In addition, the NRC inspection team reviewed a sample of condition reports and corrective actions and discussed the program with KHNP personnel responsible for the implementation of the corrective action program.

The documents reviewed by the NRC inspection team are included in the attachment to this inspection report.

b. Finding and Observations

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that for the sample evaluated, the implementation of KHNP's corrective action program is consistent with the regulatory requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

5. Entrance and Exit Meetings

On February 29, 2016, the NRC inspection team discussed the scope of the inspection during an entrance meeting with Jaesoo Lim and other KHNP, WEC, KEPCO-E&C (SD), and KEPCO-NF personnel. On March 4, 2016, the NRC inspection team presented the inspection results during an exit meeting with Jaesoo Lim and other KHNP, WEC, KEPCO-E&C (SD), and KEPCO-NF personnel.

ATTACHMENT

1. ENTRANCE/EXIT MEETING ATTENDEES

Name	Title	Affiliation	Entrance	Exit	Interviewed
James Ross	Project Manager	KHNP	X	X	
Jiyong Oh	Project Manager	KHNP	X		X
Jaesoo Lim	QA Engineer	KHNP	X	X	X
Haeng Jin Kim	QA Manager	KHNP	X	X	X
Gidong Park	QA Engineer	KNF	X		X
Tae Jin Kim	QA Engineer	KHNP	X		X
Daegeam Ahm	Project Director	KHNP	X		
Sang Seob Lee	Safety Analysis	KEPCO-E&C (SD)	X	X	X
Tae Han Kim	Project Manager	KEPCO-E&C (SD)	X		X
Sang Phil Park	QA Engineer	KEPCO-E&C (SD)	X	X	
Woochong Chon	Researcher	KEPCO-NF	X		X
Ju-hyun Park	TA Engineer	KNF	X	X	X
Sungkew Park	TH Engineer	KNF	X	X	X
Bongsik Park	SQA Engineer	KNF	X	X	X
Jill Monalan	Licensing Manager	WEC	X	X	X
Charles Slayden	Safety Analysis	WEC	X	X	
Edward Baker	Consultant	Talisman	X	X	
Aaron Armstrong	Inspection Team Leader	NRC	X	X	
George Lipscomb	Inspector	NRC	X	X	
Ashley Thomas	Inspector U/I	NRC	X	X	
Tim Drzewiecki	Tech Reviewer	NRC	X	X	
James Gilmer	Tech Reviewer	NRC	X	X	
Matt Thomas	Tech Reviewer	NRC	X	X	
Paul Prescott	Sr. Reactor Operations Engineer	NRC		X	

2. INSPECTION PROCEDURES USED

Inspection Procedure 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008

Inspection Procedure 35034, "Design Certification Testing Inspection" dated January 1, 2010

Inspection Procedure 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012

Inspection Procedure 43004, "Inspection of Commercial-Grade Dedication Programs," dated November 29, 2013

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

None

4. DOCUMENTS REVIEWED

Audits

2015-QA-4100-PM-203, KNF Audit Report, conducted February 9-11, 2015

2015-QA-4100-PM-102, KHNP internal Audit, dated March 23-27, 2015

CRI (QA) 75505-5372, KNF Audit Report, conducted July 30-August 1, 2015

CRI (QA) 75505-1191, KNF Audit Report, conducted March 16-18, 2011

CRI (QA) 75505-944, KEPCO-E&C SD Audit Report, conducted February 3-6, 2015

CRI (QA) 75505-687, APR1400 DC QA Audit Report, dated February 2, 2016

CRI (QA) 75505-7651, Corrective Action Trend Analysis (2011-2015), dated November 20, 2015

CRI (QA) 75505 - 7758, Corrective Action Trend Analysis (2011-2014), dated November 25, 2015

Corrective Action Requests (CARs)

CAR 41000-QN101-00150, "Lack of Connection in Design Deliverable," originated August 19, 2013

CAR 4100-QN101-00151, "Inappropriate Design Control," originated August 19, 2013

CAR 4100-QN101-00182, "Insufficient QA Training," originated February 27, 2015

Condition Reports (CRs)

00866323, initiated July 10, 2015

00869413 initiated July 21, 2015

00868457 initiated June 26, 2016

00866885 initiated July 13, 2015

00868890, initiated July 26, 2015

00838407, initiated March 23, 2015

00811864, initiated December 9, 2014

00623977, initiated March 21, 2013

CR-2015-0354, initiated November 16, 2015

CR-2015-0164, initiated June 16, 2015

CRs generated during inspection

00933876, initiated March 1, 2016 (in-process)

00934808, initiated March 4, 2016 (in-process)

00934807, initiated March 4, 2016 (in-process)

CR-2016-0092, initiated March 3, 2016 (in-process)

CR-2016-0095, initiated March 5, 2016 (in-process)

Quality and Project Procedures

APR1400-K-Q-TR-11005-NP, "QAPD for the APR1400 DC," Revision 5, dated September 2014

APR1400-K-Q-TR-11005-NP, "QAPD for the APR1400 DC," Revision 4, dated March 2014

APR1400 DC-QAM, "Quality Assurance Manual for APR1400 Project," Revision 7, dated February 2016

E-ND-APR1400-DC-QAM, "APR1400 DC Quality Assurance Manual," Revision 5, February 2016

QAP-15-012, "Reporting of Defects and Noncompliance," dated May 2013

QA-07-01-DC, "Review and Approval of Supplier QAM," Revision 3, dated February 2015

QA-07-02-DC, "Evaluation of the Prospective Supplier," Revision 3, dated January 2015

QA-07-04-DC, "Evaluation of QA Ability of the Sub-Supplier," Revision 1, dated January 2015

QA-15-01-DC, "Control of NCR," Revision 3, dated November 2014

QA-16-01-DC, "Control of CAR," Revision 3, dated March 2015

QA-18-01-DC, "QA Audit," Revision 3, dated March 2015

QA-18-02-DC, "Quality Surveillance," Revision 3, dated March 2015

QA-18-03-DC, "Standard Audit Checklist," Revision 2, dated March 2015

DC-BG-01, "Organization," Revision 0, dated February 2016

DC-BG-05, "Design Document Control," Revision 0, dated February 2016

DC-BG-14, "Quality Assurance Policy," Revision 0, dated February 2016

DC-BG-15, "QA Scope and Responsibilities," Revision 0, dated February 2016

DC-DG-03-04, "Review of Contracted Products," Revision 1, dated February 2016

DC-DG-03-12, "Design Analysis," Revision 1, dated February 2016

DC-DG-03-25, "Computer Software Control," Revision 0, dated February 2016

DC-DG-04-01, "Procurement Document Control," Revision 0, dated February 2016

DC-DG-16-01, "Corrective Action Program," Revision 2, dated February 2016

DC-DG-16-02, "Control of 10 CFR 21 Reporting," Revision 1, dated February 2016

DC-QAM Chapter 3.10, "Control of Computer Application and Digital Equipment Software"

KEPCO-NF procedure DP-10-10, "Design Computer Code Control," Revision 11, dated July 2012

KEPCO-NF procedure DP-10-10, "Design Computer Code Control," Attachment 5.10 and 5.11, dated September 1994

KEPCO-E&C (SD) procedure 5.13, "E&C KEPCO NSSS Division Computer Software Engineering Procedure," Revision 15, dated January 15, 2016

Quality Assurance Manual for APR1400 DC Project, Revision 1, February 2012

KAERI/TR-525/95, "Conversion Procedures Manual for Migration of Computer Codes for Domain_OS to HP/UX," dated July 1995

KNF QAP-15-02, "10 CFR Part 21 Reporting of Defects and Noncompliance in accordance with 10 CFR 21," dated April 7, 2013

KNF QAP-16-06, "Corrective Action Process," Revision 3, dated November 28, 2008

KEPCO-E&C TAP-15-01, "Reporting of 'Defects' and 'Failure to comply' pursuant to 10 CFR Part 21," Revision 1, dated February 28, 2014

KEPCO-E&C TAP-16-05, "Self-Assessment," Revision 2, dated January 29, 2014

KEPCO-E&C TAP-16-06, "Corrective Action Program," Revision 2, dated January 10, 2015

Procurement Documents

Contract L11S900070 (Korean) to Doosan for APR 1400 NRC DC, Revision 1, dated July 29, 2013

Contract L11S900070 (Korean) to Doosan for APR 1400 NRC DC, Revision 0, dated May 31, 2011

Contract L11S900010 (Korean) to KEPCO-E&C for APR 1400 NRC DC, Revision 1, dated July 31, 2013

Contract L11S900010 (Korean) to KEPCO-E&C for APR 1400 NRC DC, Revision 0, dated March 8, 2011

Contract L11S900030 (Korean) to KEPCO-NF for APR 1400 Nuclear Fuel Design, Revision 1, dated July 31, 2013

Contract L11S900030 (Korean) to KEPCO-NF for APR 1400 Nuclear Fuel Design, Revision 0, dated April 5, 2011

Contract L14S042000 (Korean) to Doosan for APR 1400 NRC DC Licensing Service, Revision 0, dated July 25, 2014

Contract L14S035000 (Korean) to KEPCO-NF for APR 1400 NRC DC Project, Revision 0, dated August 4, 2014

Contract L14S038000 (Korean) to KEPCO-E&C for APR 1400 NRC design and licensing support, Revision 0, dated August 22, 2014

Agreement to change in Service Contract L11S900030 (Korean) with KEPCO-NF dated December 27, 2012

Agreement to change in Service Contract L11S900010 (Korean) with KEPCO-E&C dated December 27, 2012

Agreement to change in Service Contract L11S900070 (Korean) with Doosan dated December 2012

QSL screen print for KEPCO-NF (Korean) dated March 1, 2016

QSL screen print for KEPCO-E&C (Korean) dated March 1, 2016

QSL screen print for Doosan (Korean) dated March 1, 2016

Work Order APR1400DC-12-03 to Westinghouse for review of Topical Report "Realistic Evaluation Methodology for Large-Break LOCA for APR1400," dated December 1, 2012

Training Records

KEPCO-NF and KEPCO-E&C (SD) training records related to personal performing software code modifications

Certificate No. CERT-NRC-DC-JD-3-4, dated November 26, 2014

Miscellaneous

TIC-99-001, "Release of CESEC, Version 89300, Mod 5," Revision 0, dated February 1, 1999

00000-SS-VV-011, "CESEC-III (HP Workstation Version) Version 89300 Mod 5," Revision 0, dated June 30, 1999

00000-SS-VV-030, "CESEC-III (PC Version) Version 89300 Mod5cs," Revision 0, dated June 6, 2013

00000-SS-VV-012, "Software Verification and Validation Report, CESEC-III PC Version and 9300 Mod 5," Revision 0, dated July 2, 1999

GEN-TH-VV-001, "Software Verification and Validation Report, CETOP Version 1 Mod 4," Revision 0, dated November 24, 1994

GEN-TH-VV-012, "CETOP V1Mod4 Software Verification and Validation Report," Revision 0, dated December 29, 1995

CCVR-TH-02-01, "KNFC Computer Code Verification Report of TORC 4.1/Mod6_kce1.hpux," Revision 0, dated 2002

CCVR-TH-02-02, "Computer Code Verification Report, CETOP Version 1 mod4_kce1, 1 Mod4_kce1a," Revision 0, dated February 19, 2002

SVR-04-L082, "Software Verification and Validation Report," Revision 0, dated September 30, 2004

SVR-08-L001, "Software Verification and Validation Report" Revision 0

S34ICD-THR-CN-010, "Generation of Thermal Margin Model (CETOP Model) for SKN 3&4 Initial Core, Final Design," Revision 0, dated September 5, 2007

NPSD-150-P, "CETOP Thermal Margin Model Development," dated April 1991

DR-97-C038, "Computer Code Verification Sheet – CETOP V1 Mod4, HP9000/HP-UX 11.11," Revision 0, September 30, 2004

CE Document 13172-PSS-030, "CESEC-SLB/80280 Certification," Revision 0, dated November 29, 1982

SVVR-SAT-10001, "Software Verification and Validation Report," RELAP5/MOD3.3/K Version 1.0," Revision 0, dated December 2, 2010

9-450-Z-S-404-11, 11A60-FS-D5701, "Design Specification for Pressurizer Pilot Operated Safety Relief Valves," Revision 2, dated March 27, 2015

Integrated Process Management Table for APR 1400 DC Engineering Work Schedule (Excel file) dated March 3, 2016

Westinghouse report of APR1400 work orders dated December 2012 (informal document)

Acceptance review of A13NJ10-TER16-P&NP-0, "LOCA Mass and Energy Release Methodology," Revision 0, dated December 15, 2014

License and Technology Transfer Agreement for NSSS System Design and Fuel and Core, Design Contract KRI-87-T1112, C.E. Order 10387, Letter NU/RD-940107L, dated February 25, 1994

69487-CS-91-002, "Verification of CESEC-III Version 89300 Installation Process on to the KAERI Computer System," Revision 0, dated February 7, 1991

CODES-FS-C-003, "CESEC-III Software Verification and Validation Report," Revision 1, dated February 25, 1992

CODES-FS-C-012, "CESEC-III Software Verification and Validation Report," Revision 9, dated February 1, 1999

N021-TA-VV-01, "CESEC-III Software Verification and Validation Report," Revision 0, dated December 1996

DRF-97-C038/3, "TORC Version 4.1 Verification Report"

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