RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: **175-8034**

SRP Section: **05.04.12 – Reactor Coolant System High Point Vents**

Application Section: **5.4.12**

Date of RAI Issue: **08/20/2015**

Question No. 05.04.12-9

10 CFR 50.34(b)(6)(iii) requires an applicant to provide plans for preoperational testing, and SRP Section 14.2, “Initial Test Program – Design Certification and New License Applicants,” provides guidance for this area of review. SRP Section 14.2 states that the applicant should provide test abstracts of SSCs and unique design features, including tests and acceptance criteria.

The acceptance criteria for DCD Tier 2, Subsection 14.2.12.1.37, “Safety Depressurization and Vent System Test,” seem to reference incorrect sections of the DCD. In particular, Acceptance Criterion 5.2 says that the RCGVS depressurization rates are presented in Table 5.4.14-1. However, the rates in the referenced table are for the POSRVs, and those for the RCGVS are found in DCD Tier 2, Section 5.4.12. Also, Acceptance Criterion 5.3 states that the safety depressurization and vent system flow paths are described in Section 5.4.12, but Section 5.4.12 only discusses the RCGVS.

For compliance with 10 CFR 50.34(b)(6)(iii) and conformance to SRP Section 14.2, please address inconsistencies in DCD Tier 2, Subsection 14.2.12.1.37 and update the DCD accordingly.

In addition, the references to Chapter 5 for Acceptance Criteria 5.1 and 5.3 do not point to specific criteria for test acceptance. Therefore, either (1) provide in DCD Sections 5.4.12 and 5.4.14 the testing requirements and associated acceptance criteria or (2) provide in Subsection 14.2.12.1.37 the specific test acceptance criteria for each test method.

Response

DCD Tier 2, Subsection 14.2.12.1.37 will be revised to incorporate the specific test acceptance criteria for each test method. In addition, safety depressurization of pressurizer POSRV is described in Subsection 14.2.12.1.3.

Impact on DCD

The revised DCD Tier 2, Section 14.2 submitted by KHNP Letter No. MKD/NW-16-0156L, dated February 24, 2016 will be revised as indicated in the attachment associated with this response.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.

5.0 ACCEPTANCE CRITERIA

5.1 The CEDM cooling fans can be started and stopped using their respective hand switches.

5.2 The airflow rate of CEDM cooling fan shall be within design limit.

5.3 The insulation resistance shall be greater than or equal to design limit.

5.4 During normal operating condition of the RCS and the CEDM cooling system ~~performs as described~~, all the CEDM coil temperatures in ~~Subsection 9.4.6.2.1.3~~CEA HOLD mode shall be remained lower than design limit in any operating condition.

Replaced with A

~~14.2.12.1.37 Safety Depressurization and Reactor Coolant Gas Vent System Test~~

~~1.0 OBJECTIVE~~OBJECTIVES

~~1.1 To verify the proper operation of the reactor coolant gas vent function~~

~~1.2 To verify the flow paths for the rapid depressurization function~~demonstrate proper operation ~~of pilot-operated safety relief~~all ~~valves (POSRVs)~~in the system

~~1.3 To demonstrate proper operation of all status lights and system alarms and valve stroke times.~~

~~1.4 To demonstrate the fail closed position of system valves upon loss of control power.~~

~~2.0 PREREQUISITES~~

~~2.1 Construction activities on the system to be tested are essentially complete.~~

2.2 Plant systems required to support testing are operable, or temporary systems are installed and operable.

2.3 Permanently installed instrumentation is operable and calibrated.

3.0 TEST METHOD

3.1 Verify flow paths through the reactor coolant gas vent system from the pressurizer to the reactor drain tank and to the in-containment refueling water storage tank (IRWST).

3.2 Verify flow paths through the reactor coolant gas vent system from the reactor vessel to the reactor drain tank and to the IRWST.

3.3 Verify that the reactor coolant gas vent system (both the pressurizer vent and the reactor vessel upper head vent) meets design depressurization rates.

3.4 Verify flow paths through manually operated POSRVs from the pressurizer to the IRWST, using water or air.

4.0 DATA REQUIRED

4.1 Valve position indications

4.2 RCS temperature and pressures

4.3 Depressurization rates using the reactor coolant gas vent function

4.4 Reactor drain tank temperature, pressure, and level

4.5 IRWST temperature, pressure, and level

~~5.0 ACCEPTANCE CRITERIA~~

~~5.1 The reactor coolant gas vent system allows~~should provide ~~venting of the pressurizer and reactor vessel through designed flow paths, as described in Subsection 5.4.12.~~

~~5.2 The reactor coolant gas vent system (both the pressurizer vent and the reactor vessel upper head vent) meets the design depressurization rates, as presented in Table~~Subsection ~~5.4.14-1~~12~~.~~

~~5.3 The safety depressurization and vent system provides a depressurization path through designed flow paths, as described in Subsection 5.4.12.~~

~~5.3 Temperature HI alarms of the pressurizer/reactor vessel upper head vent lines should be annunciated..~~

~~5.4 Pressure HI alarm of the pressurizer/reactor vessel upper head vent line should be annunciated..~~

~~5.5 Valves should meet the required stroke open/close time~~

14.2.12.1.38 Containment Spray System Test

1.0 ~~OBJECTIVE~~OBJECTIVES

1.1 To ~~verify the proper operation of~~demonstrate the containment spray ring headers and their nozzles are free of obstruction

1.2 To demonstrate the operation of the CS system ~~(CSS) and~~ remote operated valves.

1.3 To demonstrate the performance of the containment spray pumps.

~~1.2 To verify proper~~1.4 To demonstrate system responses to CSAS and SIAS signals.

A

14.2.12.1.37 Reactor Coolant Gas Vent System Test [1)]

1.0 OBJECTIVE

1.1 To verify proper operation of the reactor coolant gas vent system (RCGVS) valves.

1.2 To verify the function to provide the Reactor Coolant System (RCS) depressurization.

1.3 To verify proper operation of the instruments for temperature and pressure, and system alarms.

1.4 To verify valve response to failed conditions.

1.5 To verify valve stroke times.

2.0 PREREQUISITES

2.1 Construction activities on the systems to be tested are complete.

2.2 Plant systems required to support testing are operable and temporary systems are installed and operable.

2.3 Permanently installed instrumentation is operable and calibrated.

2.4 Test instrumentation is available and calibrated.

3.0 TEST METHOD

3.1 Verify proper operation of the valves and position indication.

3.2 Verify that the RCGVS (both the pressurizer vent and the reactor vessel closure head vent) perform the depressurization function of RCS.

3.3 Verify proper operation of the instruments and system alarms.

3.4 Verify power-operated valves fail to the position upon loss of motive power.

3.5 Verify valve opening and closing times.

4.0 DATA REQUIRED

4.1 Valve position indications

4.2 RCS temperature and pressures

4.3 Depressurization rates using the reactor coolant gas vent function

4.4 Reactor drain tank temperature, pressure, and level

4.5 IRWST temperature, pressure, and level

4.6 Setpoints of alarms

4.7 Position response of valves to loss of motive power

4.8 Valve opening and closing times

5.0 ACCEPTANCE CRITERIA

5.1 The RCGVS valves are opened and closed by their respective hand switches, and the position indicator for each valve indicates the status of valve (open or close) properly following the corresponding valve operation.

5.2 The RCGVS (both the pressurizer vent and the reactor vessel closure head vent) meets the depressurization rates.

5.3 Alarms for high temperature and high pressure are properly annunciated.

5.4 The RCGVS valves fail to the required position on loss of power and go to the position indicated upon restoration of power.

5.5 The RCGVS valves maximum opening and closing times are satisfied.

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1) It is also performed during Pre-core HFT

Table 14.2-1 (2 of 5)

Subsection	Test
14.2.12.1.27	Digital rod control system test
14.1.12.1.28	Reactor regulating system test
14.2.12.1.29	Steam bypass control system test
14.2.12.1.30	Feedwater control system test
14.2.12.1.31	Core operating limit supervisory system test
14.2.12.1.32	Reactor power cutback system test
14.2.12.1.33	Fuel handling and storage system test
14.2.12.1.34	Auxiliary feedwater system test
14.2.12.1.35	Reactor coolant system hydrostatic test
14.2.12.1.36	Control element drive mechanism cooling system test
14.2.12.1.37	~~Safety depressurization and vent system test~~
14.2.12.1.38	Containment spray system test
14.2.12.1.39	Integrated engineered safety features / loss of power test
14.2.12.1.40	In-containment water storage system test
14.2.12.1.41	Internals vibration monitoring system test
14.2.12.1.42	Loose parts monitoring system test
14.2.12.1.43	Acoustic leak monitoring system test
14.2.12.1.44	Information processing system and qualified information and alarm system test
14.2.12.1.45	Turbine generator building open cooling water system test
14.2.12.1.46	Pre-core hot functional test controlling document
14.2.12.1.47	Pre-core instrument correlation
14.2.12.1.48	Remote shutdown console test
14.2.12.1.49	Diverse protection system test
14.2.12.1.50	Pre-core test data record
14.2.12.1.51	Pre-core reactor coolant system expansion measurements
14.2.12.1.52	Pre-core reactor coolant and secondary water chemistry data
14.2.12.1.53	Pre-core pressurizer performance test

Reactor coolant gas vent system test

Table 14.2-7 (1 of 18)

Conformance Matrix of RG 1.68 Appendix A versus Individual Test Descriptions

This table provides the matrix of applicable guidance of NRC RG 1.68 (Reference 3) Appendix A (Initial Test program) versus individual test descriptions listed in Subsection 14.2.12 so as to conform the key test parameters systematically.

RG 1.68 APP. A	Subsection #	Individual Test
1.a.1	14.2.12.1.46 14.2.12.1.51	Pre-core hot functional test controlling document Pre-core reactor coolant system expansion measurements
1.a2.a	14.2.12.1.4 14.2.12.1.53	Pressurizer pressure and level control systems test Pre-core pressurizer performance test
1.a.2.b	14.2.12.1.1 14.2.12.1.2	Reactor coolant pump motor initial operation test Reactor coolant system test
1.a.2.c	14.2.12.1.30 14.2.12.1.35 14.2.12.1.72	Feedwater control system test Reactor coolant system hydrostatic test Steam generator hydrostatic test
1.a.2.d	14.2.12.1.3 14.2.12.1.9 14.2.12.1.37	Pressurizer pilot-operated safety relief valve test Reactor drain tank subsystem test ~~Safety depressurization and vent system test~~
1.a.2.e	-	Not applicable MSIVs are not in the RCS of the APR1400 design. Reactor coolant gas vent system test
1.a.2.f	14.2.12.1.46	Pre-core hot functional test controlling document
1.a.2.g	14.2.12.1.4 14.2.12.1.28	Pressurizer pressure and level control systems test Reactor regulating system test
1.a.2.h	14.2.12.1.41 14.2.12.1.42 14.2.12.1.43	Internals vibration monitoring system test Loose parts monitoring system test Acoustic leak monitoring system test
1.a.2.i	14.2.12.1.3	Pressurizer pilot-operated safety relief valve test
1.a.2.j	-	Not applicable This is not a design feature of the APR1400
1.a.2.k	-	Not applicable This is not a design feature of the APR1400