

Discussion on Radiation Protection

1. Introduction
2. Issues That Need Clarifications
3. KHNP's Proposed Plan

1. Introduction (1/2)

❖ Interactions on Radiation Protection Issues

- 06/2013 : NRC Pre-application Audit
 - NRC raised 46 issues after review of draft DCD
- 08/2013 : 11th Pre-application Review Meeting
 - KHNP presented resolution of the all 46 pre-application audit issues
 - NRC raised additional 59 issues on the revised draft DCD
- 09/2013 : APR1400 DC Application
 - KHNP resolved all 59 issues and reflected in the final DCD
 - KHNP applied for DC
- 11/2013 : Acceptance Review Comments
 - NRC unofficially issued 11 items (23 sub-items) including ER/SAMDA issues
 - KHNP submitted responses to NRC
 - Conference call for clarification scheduled on 12/4/2013 was postponed
- 12/2013 : Non-acceptance Issue
 - NRC issued 8 RP items and 7 ER/SAMDA related RAIs
- 02/2014 : Official Review Comments
 - NRC issued new 36 items
- 02/2014 : Clarification Meeting

1. Introduction (2/2)

❖ Clarification on Acceptance Review Issues

- Total number of comments : **41 items**
 - Official review issues (Feb. 2014) : 36 items
 - Preliminary review issues (Dec. 2013) : 5 items
- Number of comments that need clarifications : **16 items**
- Focus on those comments that need clarifications from NRC staffs
 - To confirm if KHNP's understandings are correct
 - To discuss the proposed responses, strategies and plan to satisfy the guidance requirements, and set priorities to complete all responses
 - To clarify if there are any further concerns that are not addressed in the report

2-1. Issues That Need Clarifications

(RP & RMS)

- Number of Issues : 30 Items
 - Official (Feb, 2014) : 25 Items
 - Preliminary (Dec, 2013) : 5 Items

2-1. RP & RMS Issues (1/17)

- ❖ The DCD should evaluate the SRP 11 including all references, design features, analytical techniques and procedural measures

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2-1. RP & RMS Issues (2/17)

- ❖ Epoxy coatings are not approved by NRC for retention of liquids. Justify the used of epoxy coatings as an acceptable liner. Describe the maintenance and inspection program to ensure the integrity of epoxy coating.

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2-1. RP & RMS Issues (3/17)

- ❖ Section 11.5.2.3 does not include description and verification of automatic actuations based on detection of activity level or failure of radiation detectors

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- ❖ Provide description on actuation or interlocks based on failure of an effluent radiation monitor

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2-1. RP & RMS Issues (4/17)

- ❖ Ensure that all RW SSCs are identified and included in terms of source terms and classification per RG 1.143^{TS}

- ❖ Tier 1 does not include ITAAC to confirm monitoring and control of effluent releases, source test, alarms, indications, and automatic initiation functions

2-1. RP & RMS Issues (5/17)

- ❖ Information used in LADTAP II code are incomplete. Provide basis in DCD and I/O files^{TS}

2-1. RP & RMS Issues (6/17)

- ❖ Per BTP 11-6, liquid radwaste system failure shall consider most adverse contamination in groundwater. And the radionuclides causing highest potential exposure such as Tc-99 and I-129 shall be included.

TS

- ❖ Information used in GASPAR code are incomplete. Provide basis and I/O files in DCD

TS

2-1. RP & RMS Issues (7/17)

- ❖ The DCD should evaluate the SRP 12 including all references, design features, analytical techniques and procedural measures

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- ❖ Section 12.1.1.2, which states that the RP manager reports to operation director, is contradictory to RG 8.8

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2-1. RP & RMS Issues (8/17)

- ❖ In Section 12.2, it is not clear what shielding analysis was performed with each computer code ^{TS}

- ❖ Radiation zones in Turbine Building and CCW structure shall be provided ^{TS}

2-1. RP & RMS Issues (9/17)

- ❖ Ch. 12 states that S/S or nickel based alloys will be used in systems in contact with the RCS. RG 8.8 indicates that use of nickel should be avoided

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- ❖ DCD states that buried piping is minimized to the extent practicable. But it does not describe the areas where buried piping is expected to exist.

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2-1. RP & RMS Issues (10/17)

- ❖ Stay times to conduct activities in vital areas outside of MCR/TSC shall be included

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- ❖ All SRP criteria related to operational RP program including access controls and surveys shall be included in the COL item
 - KHNP will modify Section 12.5 to be more explanative to specify the detailed operational RP programs required in SRP 12.5

2-1. RP & RMS Issues (11/17)

- ❖ Certain radiation monitors are tested with a simulated signal instead of actual radiation source. Functions can only be ensured if an actual radiation source is used to test at lower energy levels

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- ❖ The COL item related to RG 4.21 shall be identified in Section 12.1
 - Description addressed in 12.1.3.1 is for the operational procedures and programs to address contamination control measures in accordance with RG 4.21
 - This subsection already provides reference of COL item 12.3(1) in Section 12.3

2-1. RP & RMS Issues (12/17)

- ❖ Table 12.2-5 is not clear why ANSI/ANS-18.1 is referenced for some isotopes and not for others

TS

- ❖ Section 12.3.1.9 does not include all access routes to vital areas identified in Section 12.3.1.8.

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2-1. RP & RMS Issues (13/17)

- ❖ For EQ other accidents than LOCA, MSLB and HELB are not analyzed. Justify addition of 20% instead of using actual dose calculations

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- ❖ It need clarification which source terms are based for radiation zoning in Section 12.3.1.6

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2-1. RP & RMS Issues (14/17)

- ❖ Tech. Spec. does not refer to NEI 07-06 or EPRI document for SG program
 - (Clarification) KHNP understands that NEI 07-06 is not applicable because it is 'Nuclear regulatory process'.
- ❖ Section 3.11 includes main steam line monitors in EQ program. These monitors are not safety-related or connected to a 1E power supply.

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2-1. RP & RMS Issues (15/17)

- ❖ Provide additional information on radiation monitor alarms and ranges
 - Tables 11.5-1 and 12.3-6 provide the ranges and functions of each monitor
 - **(Clarification)** Since alarm setpoints for effluent monitors are determined using site-specific meteorological information, these will be provided by the COL applicant. A COL item will be added in Sections 11.5 and 12.3

- ❖ Identify monitoring channels of MCR air intake monitor

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2-1. RP & RMS Issues (16/17)

- ❖ Range of RE-286 (Inst. calibration room area monitor) is inadequate because it has a range up to 100 mSv/h whereas the room is designed as Zone 8 (>5,000 mSv/h)

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2-1. RP & RMS Issues (17/17)

- ❖ Section 12.4.1.2.1 does not provide details on how APR1400 improved design to reduce ORE
 - Specific design features of APR1400 to minimize ORE are described in Section 12.3.1 “Facility Design Features”
 - **(Clarification)** Section 12.4.1.2.1 will be revised to refer to Section 12.3.1

- ❖ ORE result tables do not provide all of the information suggested in RG 8.19 such as number of workers or frequency of each activity

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2-2. Issues That Need Clarifications (Radwaste Systems)

- Number of Issues : 11 Items
 - Official (Feb, 2014) : 11 Items
 - Preliminary (Dec, 2013) : 0 Items

2-2. Radwaste System Issues (1/7)

- ❖ Tier 1 does not include a section on how the LWMS is designed to process liquid waste prior to release and ensure compliance with 10 CFR 20, Appendix B, Table 2 effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives for liquid effluents when the plant is operational.

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- ❖ Tier 1 does not include a section on how the GWMS is designed to process gaseous waste and ensure compliance with 10 CFR 20 and 50.

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2-2. Radwaste System Issues (2/7)

- ❖ Tier 1 does not include a section on
 - 1) the process design of the LWMS subsystems and how the initial loading of the subsystem demineralizers and vessels includes the appropriate types of filtration and adsorption media that will meet or exceed the decontamination factors listed in the DCD.
 - 2) the assigned ITAAC to confirm the liquid filter efficiency and demineralizer media.
- The third item in Table 2.7.6.1-2 provides the ITAAC to confirm the efficiency and performance of the filter media and ion exchanger resins by verifying that the filter media and ion exchanger resins specified by vendor for LWMS R/O package system are loaded in R/O package system. This includes types and volumes of filter media and resins.
- Tier 2, Chapter 11.2 provides the subsystem configuration and the related DF in accordance with NUREG-0017.
- The type and volumes will be determined by the supplier with operating experiences of supplied system in nuclear power plants. The related DF and efficiency will also be confirmed during the selection of supplier and the detail design period using operation or test data of the system .

2-2. Radwaste System Issues (3/7)

- ❖ Tier 1 does not include a section on the assigned ITAAC to confirm the gaseous filter efficiency.

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- ❖ Describe the provisions of GWMS to minimize explosive mixture and isolate continuous gaseous leakage path on explosion event.

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2-2. Radwaste System Issues (4/7)

- ❖ Define SWMS Boundaries
 - SWMS boundaries for each waste stream will be added in Section 11.4

- ❖ Section 11.4.2.1.1 stated that COL applicant is to include description of wastes other than normally accumulated non-radioactive wastes such as wasted activated carbon from GWMS charcoal beds, solid wastes coming from component (Steam generator, Reactor vessel etc.) replacement activities, and other unusual cases. Justify why this information was not included as a COL information item.

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2-2. Radwaste System Issues (5/7)

- ❖ Justify why the information on the ranges, setpoints, and references for the instruments of spent resin dewatering system was not included as a COL information item.

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- ❖ Provide a description of how the spent activated carbon from LWMS is direct transfer is performed.

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2-2. Radwaste System Issues (6/7)

- ❖ Provide in the DCD a description of the specific disposition of the gaseous exhaust from any fill head during transfer and dewatering activities.

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2-2. Radwaste System Issues (7/7)

- ❖ The Table 3.2-1, does not list the building classification in accordance with RG 1.143. Instead of the seismic classification it should say natural phenomena and Internal/External Man-induced Hazard design criteria.

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3. KHNP's Proposed Plan

- ❖ KHNP plans to revise and re-submit the DCD for DC application according to the following schedule assuming that KHNP's understandings on the issues are correct

Schedule is to be determined after the NRC meeting

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