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## 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.: 305-8375  
SRP Section: 06.01.02 – Protective Coating Systems (Paints) – Organic Materials  
Application Section: 6.1.2  
Date of RAI Issue: 11/12/2015

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### **Question No. 06.01.02-1**

The title of Final Safety Analysis Report (FSAR) Subsection 6.1.2, “Organic Materials,” does not match the content, which includes inorganic coatings. Please discuss your plans to address this, for example by providing a new subsection title, such as “Protective Coatings and Organic Materials.” This will improve the accuracy of the FSAR organization and assist in finding information in the future.

### **Response**

The title of DCD Tier 2, Section 6.1.2 will be revised from “Organic Materials” to “Protective Coatings and Organic Materials” as shown in the attachment associated with this response.

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### **Impact on DCD**

The DCD will be revised as indicated in the Attachment.

### **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.

**APR1400 DCD TIER 2**6.1.2 ~~Organic Materials~~

Organic materials including wood, clothes, plastics, lubricants, and asphalt are not used inside the containment.

The protective coatings used inside the containment, Service Level I, have been demonstrated to withstand design basis conditions and meet the guidance in NRC RG 1.54 (Reference 13).

Any particulate debris of appreciable size that occurs either settles to the bottom of the HVT or is trapped by the filter screen at the bottom of the IRWST.

The coatings are able to withstand the harsh conditions of high pressures and temperatures from a combined postulated LOCA and main steam line break (MSLB).

Service Level I coatings, as defined in ASTM D5144-08 (Reference 14), apply to all coatings on structures, equipment, and components inside the containment where the failure of the coatings could adversely affect the operation of post-accident fluid systems and impair a safe shutdown.

The selection of Service Level I coatings is based on ASTM Standards D 5144-08, ASTM D3911-08 (Reference 15), and ASTM D3843-08 (Reference 16). The coatings protect the surfaces of facilities, equipment, and components against corrosion and contamination during plant operation.

The substrate requiring Service Level I coating systems are listed below. A list of applicable coatings per substrates is given in Table 6.1-3.

a. Ferrous metal surfaces

Exposed surfaces of the containment liner plates, equipment hatch and personnel airlocks, structural steels, and miscellaneous steels.

b. Concrete surface

6.1.2 Protective Coatings and Organic Materials

6.1.2.1 Protective Coatings

The protective coatings of APR1400 meet the intent and recommendations of USNRC Regulatory Guide 1.54, Rev.2 (Reference 13) and its related ASTM code/standards. The protective coatings are to be used on the following areas based on the Service Level definition of RG 1.54.

a. Service Level I coatings

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## 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.: 305-8375  
SRP Section: 06.01.02 – 2 Protective Coating Systems (Paints) - Organic Materials  
Application Section: 6.1.2  
Date of RAI Issue: 11/12/2015

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### **Question No. 06.01.02-2**

FSAR Section 6.1.2 states, “Organic materials including wood, clothes, plastics, lubricants, and asphalt are not used inside the containment.” The meaning of this sentence is not clear to the staff, since organic material such as epoxy coating is used inside containment according to FSAR Table 6.1-3. Organic cable insulation is also typically used inside containment. Please discuss your plans to clarify the use of organic materials in containment and any associated FSAR revisions.

### **Response**

Subsection 6.1.2.2, COL 6.1(3), and Table 6.1-4 have been added to the DCD to describe cable insulation and reactor coolant pump lubricant as other organic materials present inside containment, as shown in the attachment associated with this response.

The radiation and chemical decomposition products of the other organic materials present inside containment have not been evaluated due to hydrogen release being determined as not risk-significant per FR-54123(’03.9.16).

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### **Impact on DCD**

The DCD section 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.

**APR1400 DCD TIER 2**

Indoor surfaces of concrete walls, ceilings, and floors that require protection from a corrosive atmosphere, chemical attack and wear, irradiation, radioactive materials, and the decontamination processes and provide for general maintenance and abrasion service.

The practice of quality assurance for protective coatings applied to the inside of the containment satisfies the requirements of 10 CFR Part 50 Appendix B, ASME NQA-1-2008, and ASTM D3843-00. The records of manufacture's product identity certification, shipping and receiving, warehousing, applicator's material identification, surface preparation and coating application, inspector qualification, daily coating work inspection, and inspector and applicator training are monitored to ensure the quality of Service Level I coatings.

As required in the NRC maintenance rule 10 CFR 50.65, the coating program to monitor effectiveness of maintenance for Service Level I coatings includes materials, storage, equipment, application, inspection, and training. The combined license (COL) applicant is to identify the implementation milestones for the coatings program (COL 6.1(1)).

Insert 'A'

#### 6.1.3 Combined License Information

COL 6.1(1) The COL applicant is to identify the implementation milestones for the coatings program.

#### 6.1.4 References

**COL 6.1(3)** The COL applicant is to identify the amount of cable insulation/jacket inside containment as indicated in Table 6.1-4.

1. ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda.
2. ASME Boiler and Pressure Vessel Code, Section II, "Materials," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda
3. Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.

'A'

#### 6.1.2.2 Organic Materials

Cables are installed inside containment. Cable jackets are designed to protect the cable from mechanical damage during installation and to provide chemical and fire protection to the cable insulation. Chlorosulfonated polyethylene (CSPE-HD, Hypalon) or polychloroprene (CR, Neoprene) shall be used as jacket material. Cable insulation electrically separates the conductors in a cable from each other and from ground. Ethylene propylene rubber (EPR) or cross-linked polyethylene (XLPE) shall be used as insulation.

The reactor coolant pumps use a petroleum based oil lubricant to reduce friction.

A listing of other organic materials used inside of containment is included in Table 6.1-4. The materials listed are not protective coatings applied to surfaces of the structures, systems and components.

Table 6.1-4

Other Organic Materials inside Containment

Item	Material	Approximate Amount
Reactor Coolant Pump lubricant	Petroleum base oil	[ 1,135 L(300 gal) ] TS
Cable Insulation/Jacket	EPR/CSPE-HD XLPE/CSPE-HD EPR/CR-HD XLPE/CR-HD	[ TBD ] TS



Added

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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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Docket No. 52-046

RAI No.: 305-8375  
SRP Section: 06.01.02 – Protective Coating Systems (Paints) – Organic Materials  
Application Section: 6.1.2  
Date of RAI Issue: 11/12/2015

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### **Question No. 06.01.02-3**

Discuss your plans to revise Section 6.1.2 and Table 6.1-3 of the FSAR to clarify the use of coating systems with substrate materials inside the containment structure. Specifically,

- In the text of FSAR Section 6.1.2, expand the discussion to describe each type of coating and the corresponding substrate material(s). Table 6.1-3 should summarize, not replace, the description in the text.
- In the first column (“Surface To Be Coated”) of the first three rows in Table 6.1-3, identify the applicable substrate material(s).
- In the second column (“Type of Coating”) of the first row of Table 6.1-3, identify which are the primer and top coat layers.
- In the text of FSAR Section 6.1.2, paragraph “a.” is called, “Ferrous metal surfaces.” Since “ferrous metal” includes all grades of steel, including stainless steels, revise this heading to be clear about the substrate materials.

### **Response**

To clarify the use of coating systems with substrate materials inside the containment structure, the DCD will be revised as shown in the attachment associated with this response.

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### **Impact on DCD**

The DCD will be revised as indicated in the Attachment.



**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.

**APR1400 DCD TIER 2****6.1.2 Organic Materials**

Organic materials including wood, clothes, plastics, lubricants, and asphalt are not used inside the containment.

The protective coatings used inside the containment, Service Level I, have been demonstrated to withstand design basis conditions and meet the guidance in NRC RG 1.54 (Reference 13).

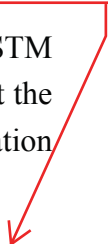
Any particulate debris of appreciable size that occurs either settles to the bottom of the HVT or is trapped by the filter screen at the bottom of the IRWST.

The coatings are able to withstand the harsh conditions of high pressures and temperatures from a combined postulated LOCA and main steam line break (MSLB).

Service Level I coatings, as defined in ASTM D5144-08 (Reference 14), apply to all coatings on structures, equipment, and components inside the containment where the failure of the coatings could adversely affect the operation of post-accident fluid systems and impair a safe shutdown.

The selection of Service Level I coatings is based on ASTM Standards D 5144-08, ASTM D3911-08 (Reference 15), and ASTM D3843-08 (Reference 16). The coatings protect the surfaces of facilities, equipment, and components against corrosion and contamination during plant operation.

insert A (next page)



~~The substrate requiring Service Level I coating systems are listed below. A list of applicable coatings per substrates is given in Table 6.1-3.~~

~~a. Ferrous metal surfaces~~

~~Exposed surfaces of the containment liner plates, equipment hatch and personnel airlocks, structural steels, and miscellaneous steels.~~

~~b. Concrete surface~~

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The following coating systems are applicable to the containment building. A list of applicable coatings is given in Table 6.1-3.

a. Coating system descriptions for ferrous metal surfaces

These systems provide corrosion protection for exposed ferrous metal surfaces.

The following surfaces shall not be coated unless indicated otherwise.

- Stainless steel
- Galvanized steel
- Machined or wearing surfaces

- 1) Exposed surfaces of the containment liner plates, equipment hatch and personnel airlocks, structural steels, and miscellaneous steels
  - a) Inorganic zinc primer coat
  - b) Epoxy finish coat
- 2) Exposed surfaces of equipment and components having a surface temperature less than 93.3°C (200°F).
  - a) Epoxy primer coat
  - b) Epoxy finish coat
- 3) Exposed surfaces of equipment and components having a surface temperature of 93.3°C (200°F) to 398.9°C (750°F).
  - a) One coat of inorganic zinc primer

b. Coating system descriptions for concrete surfaces

Indoor surfaces of concrete that require protection from a corrosive atmosphere, chemical attack and wear, irradiation, radioactive materials, and decontamination processes and provide for general maintenance and abrasion service.

- 1) Concrete ceiling, wall, and floor
  - a) Epoxy primer coat
  - b) Epoxy surfacer coat
  - c) Epoxy finish coat

**APR1400 DCD TIER 2**

~~Indoor surfaces of concrete walls, ceilings, and floors that require protection from a corrosive atmosphere, chemical attack and wear, irradiation, radioactive materials, and the decontamination processes and provide for general maintenance and abrasion service.~~

The practice of quality assurance for protective coatings applied to the inside of the containment satisfies the requirements of 10 CFR Part 50 Appendix B, ASME NQA-1-2008, and ASTM D3843-00. The records of manufacturer's product identity certification, shipping and receiving, warehousing, applicator's material identification, surface preparation and coating application, inspector qualification, daily coating work inspection, and inspector and applicator training are monitored to ensure the quality of Service Level I coatings.

As required in the NRC maintenance rule 10 CFR 50.65, the coating program to monitor effectiveness of maintenance for Service Level I coatings includes materials, storage, equipment, application, inspection, and training. The combined license (COL) applicant is to identify the implementation milestones for the coatings program (COL 6.1(1)).

### 6.1.3 Combined License Information

COL 6.1(1) The COL applicant is to identify the implementation milestones for the coatings program.

### 6.1.4 References

1. ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda.
2. ASME Boiler and Pressure Vessel Code, Section II, "Materials," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda
3. Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.

## APR1400 DCD TIER 2

Table 6.1-3

Coating Material Used in the Containment Structure

<u>Surface To Be Coated</u>	<u>Type of Coating</u>
<del>Containment liner plate, equipment hatch and personnel airlock and structural miscellaneous steel</del>	<del>Inorganic zinc / epoxy</del>
<del>Equipment and components having a surface temperature of less than 93.3 °C (200 °F)</del>	<del>Epoxy primer / epoxy top coat</del>
<del>Equipment and components having a surface temperature of 93.3 °C (200 °F) to 398.9 °C (750 °F)</del>	<del>Inorganic zinc</del>
<del>Concrete ceiling, wall, and floor</del>	<del>Epoxy primer / epoxy surface / epoxy top coat</del>

Replace it with next page table

**APR1400 DCD TIER 2**

Table 6.1-3

Coating Material Used in the Containment Structure

Surface To Be Coated		Type of Coating
Ferrous Metal Surface*	Containment liner plate, equipment hatch and personnel airlock and structural miscellaneous steel	Inorganic zinc primer/ Epoxy finish coat
	Equipment and components having a surface temperature of less than 93.3 °C (200 °F)	Epoxy primer / Epoxy finish coat
	Equipment and components having a surface temperature of 93.3 °C (200 °F) to 398.9 °C (750 °F)	Inorganic zinc primer
Concrete ceiling, wall, and floor		Epoxy primer / Epoxy surfacer / Epoxy finish coat

\* Stainless steel, galvanized steel, and machined or wearing surfaces shall not be coated unless indicated otherwise.

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## 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.:** 305-8375  
**SRP Section:** 06.01.02 – Protective Coating Systems (Paints) – Organic Materials  
**Application Section:** 6.1.2  
**Date of RAI Issue:** 11/12/2015

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### **Question No. 06.01.02-4**

According to the FSAR, the APR1400 conforms to Regulatory Guide (RG) 1.54, Rev. 2, “Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants”, and FSAR Section 6.1.2 states that selection of Service Level I coatings is based on ASTM Standards D3911-08, D5144-08, and D3843-08. However:

- In RG 1.54, Rev. 2, the staff states that it is acceptable to use ASTM D3911-08, but only with specific acceptance criteria listed in the RG. These criteria were listed in previous revisions of D3911 but were removed from the 2008 version.
- D3843 was reapproved in 2008 without changes. Therefore, “D3843-08” is incorrect notation. This standard is identified by ASTM as “D3843-00 (reapproved 2008).
- The FSAR does not address the basis for selection of coatings other than Service Level I, but RG 1.54 addresses all Service Levels.

Please discuss your plans to revise FSAR Section 6.1.2 to establish consistency in the way coatings are being addressed through conformance to RG 1.54, Rev. 2, and the associated ASTM standards. Specifically:

- Revise FSAR Section 6.1.2 to describe the use of all coating service levels as defined in RG 1.54, Rev. 2. This information is needed for conformance with RG 1.54, which addresses coatings located in both safety-related and non-safety-related plant regions. Rev. 0 of the APR1400 FSAR addresses only Service Level I coatings (safety-related inside containment).
- Correct the notation for ASTM Standard D3843 and confirm that ASTM Standard D3911-08 will be used with the acceptance criteria listed in RG 1.54, Rev. 2.

- State that the protective coatings used inside the containment, Service Level I, are demonstrated to withstand design basis accident conditions (rather than design basis conditions) and to identify the type(s) of design basis accidents and test conditions on which this statement is based.
- Identify the selection criteria for Service Level III coatings and any Service Level II coatings used inside containment.
- Identify exceptions to the positions in RG 1.54, Rev. 2. For example, differences between the versions of ASTM standards being applied to the APR1400 and those accepted in the RG need to be identified as exceptions.

### **Response**

To describe the use of all coating service levels, the DCD will be revised as shown in the attachment associated with this response. (Para. a, b, c)

To correct the notation for ASTM D3843, and to make sure that ASTM Standard D3911-08 will be used with the minimum acceptance criteria listed in RG 1.54, Rev. 2, the DCD will be revised as shown in the attachment associated with this response. (3rd sentence, Para. a)

The test condition for protective coatings, which is provided as the EQ profile in the DCD Figure 3.11-1, is determined from the containment pressure and temperature response calculation to all postulated high energy line breaks including LOCAs and MSLBs. In the containment response calculation, the protective coatings are modeled to maximize containment pressure and temperature results and, as presented in the DCD Table 6.2.1-19, the highest peak pressure and temperature are determined from the LOCA (Coldleg Double-Ended Discharge Leg Slot Break with maximum SI flow) and MSLB(102% power, and MSIV single-failure), respectively. Accordingly, to state that Service Level I coatings are demonstrated to withstand design basis accident conditions, and to identify the type of design basis accidents and test conditions, the DCD will be revised as shown in the attachment associated with this response. (2nd sentence, Para. a)

All coatings inside the reactor containment are Service Level I coatings. To identify the selection criteria for Service Level III coatings, the DCD will be revised as shown in the attachment. (2nd sentence, Para. c)

Protective coatings of NRC APR1400 will conform to the ASTM standards referenced by RG 1.54, Rev.2. Therefore, there are no exceptions to the regulatory positions in RG 1.54, Rev.2.

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### **Impact on DCD**

The DCD will be revised as indicated in the Attachment.

### **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.

**APR1400 DCD TIER 2****6.1.2 Organic Materials**

~~Organic materials including wood, clothes, plastics, lubricants, and asphalt are not used inside the containment.~~

~~The protective coatings used inside the containment, Service Level I, have been demonstrated to withstand design basis conditions and meet the guidance in NRC RG 1.54 (Reference 13).~~

~~Any particulate debris of appreciable size that occurs either settles to the bottom of the HVT or is trapped by the filter screen at the bottom of the IRWST.~~

~~The coatings are able to withstand the harsh conditions of high pressures and temperatures from a combined postulated LOCA and main steam line break (MSLB).~~

~~Service Level I coatings, as defined in ASTM D5144 08 (Reference 14), apply to all coatings on structures, equipment, and components inside the containment where the failure of the coatings could adversely affect the operation of post-accident fluid systems and impair a safe shutdown.~~

~~The selection of Service Level I coatings is based on ASTM Standards D 5144 08, ASTM D3911 08 (Reference 15), and ASTM D3843 08 (Reference 16). The coatings protect the surfaces of facilities, equipment, and components against corrosion and contamination during plant operation.~~

The substrate requiring Service Level I coating systems are listed below. A list of applicable coatings per substrates is given in Table 6.1-3. replace with A(next page)

a. Ferrous metal surfaces

Exposed surfaces of the containment liner plates, equipment hatch and personnel airlocks, structural steels, and miscellaneous steels.

b. Concrete surface

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## 6.1.2 Protective Coatings and Organic Materials

### 6.1.2.1 Protective Coatings

The protective coatings of the APR1400 meet the intent and recommendations of USNRC Regulatory Guide 1.54, Rev.2 (Reference 13) and its related ASTM code/standards. The protective coatings are to be used on the following areas based on the Service Level definition of RG 1.54.

#### a. Service Level I coatings

Service Level I coatings are used in all areas inside the reactor containment.

The protective coatings used inside the containment are demonstrated to withstand the design basis accident (DBA) conditions resulting from the postulated high energy line breaks, including the Loss of Coolant Accident (LOCA) and Main Steam Line Break (MSLB) combined environment.

The selection of Service Level I coatings is based on ASTM Standards D 5144-08 (Reference 14), ASTM D3911-08 (Reference 15) with the minimum acceptance criteria listed in RG 1.54, and ASTM D3843-00 (reapproved 2008) (Reference 16). The coatings protect the surfaces of facilities, equipment, and components against corrosion and contamination during plant operation.

#### b. Service Level II coatings

Service Level II coatings are used in areas outside the reactor containment that are subject to radiation exposure and radionuclide contamination.

Service Level II coatings are not safety-related and not subjected to DBA testing.

#### c. Service Level III coatings

Service Level III coatings are used in areas outside the reactor containment where failure could adversely affect the safety function of a safety-related structure, system, or component.

Testing and evaluation of Service Level III coatings are to be conducted as necessary to ensure that the coatings are suitable for the specific service environment on a case by case basis.

**APR1400 DCD TIER 2**

16. ASTM D3843, “Standard Practice for Quality Assurance for Protective Coatings Applied to Nuclear Facilities,” American Society for Testing and Materials, ~~2008~~.

2000 (reapproved 2008)



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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

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Docket No. 52-046

RAI No.: 305-8375  
SRP Section: 06.01.02 – Protective Coating Systems (Paints) – Organic Materials  
Application Section: 6.1.2  
Date of RAI Issue: 11/12/2015

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### **Question No. 06.01.02-5**

FSAR Section 6.1.2 describes the applicability of Service Level I to coatings on structures, equipment, and components. Please describe how the use of Service Level I will be assured for manufactured components that cannot be procured with coatings meeting the Service Level I requirements. In addition, provide your plans for addressing this in the FSAR. This information is needed to demonstrate that the coatings conform to the guidance in RG 1.54, Rev. 2.

### **Response**

All purchase order specifications for the APR1400 require that all structures, equipment, and components inside the containment building shall be procured with qualified coatings meeting the Service Level I requirements. There are no exceptions.

If any components with nonconforming coatings are installed inside the containment building due to unavoidable circumstances, the COL applicant is to manage the nonconforming coatings in accordance with ASTM D7491-08.

Accordingly, the DCD will be revised as shown in the attachment associated with this response.

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### **Impact on DCD**

The DCD will be revised as indicated in the Attachment.

### **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.

**APR1400 DCD TIER 2**

The combined license (COL) applicant is to manage nonconforming coatings that do not meet the Service Level I requirements in accordance with ASTM D7491-08.(COL 6.1(1)).

Indoor surfaces of concrete walls, ceilings, and floors that require protection from a corrosive atmosphere, chemical attack and wear, irradiation, radioactive materials, and the decontamination processes and provide for general maintenance and abrasion service.

The practice of quality assurance for protective coatings applied to the inside of the containment satisfies the requirements of 10 CFR Part 50 Appendix B, ASME NQA-1-2008, and ASTM D3843-00. The records of manufacture's product identity certification, shipping and receiving, warehousing, applicator's material identification, surface preparation and coating application, inspector qualification, daily coating work inspection, and inspector and applicator training are monitored to ensure the quality of Service Level I coatings.

As required in the NRC maintenance rule 10 CFR 50.65, the coating program to monitor effectiveness of maintenance for Service Level I coatings includes materials, storage, equipment, application, inspection, and training. The combined license (COL) applicant is to identify the implementation milestones for the coatings program (COL 6.1(1)).

### 6.1.3 Combined License Information

COL 6.1(1) The COL applicant is to identify the implementation milestones for the coatings program.

### 6.1.4 References

COL 6.1(1) The COL applicant is to manage nonconforming coatings that do not meet the Service Level I requirements in accordance with ASTM D7491-08.

1. ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda.
2. ASME Boiler and Pressure Vessel Code, Section II, "Materials," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda
3. Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.

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Application Section: 6.1.2  
Date of RAI Issue: 11/12/2015

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### **Question No. 06.01.02-6**

Please provide a revision FSAR Section 6.1.2, Combined License (COL) Item 6.1(1), that will require a COL applicant to describe the coatings program and its implementation, including maintenance and repair of coatings. This program should apply to all safety-related coatings, not only Service Level I coatings. This is required to comply with 10 CFR Part 50, Appendix B, and the Maintenance Rule (10 CFR 50.65), and the staff considers it the responsibility of a COL applicant to provide this information. Rev. 0 of the FSAR acknowledges that a coatings program is required, and it proposes COL Item 6.1(1) for the implementation milestones, but it does not require the COL applicant to describe the program.

### **Response**

The COL Item 6.1(1) will be revised to require a COL applicant to describe the coating program. The DCD will be revised as shown in the attachment associated with this response.

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#### **Impact on DCD**

The DCD will be revised as indicated in the Attachment.

#### **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.



**APR1400 DCD TIER 2**

Indoor surfaces of concrete walls, ceilings, and floors that require protection from a corrosive atmosphere, chemical attack and wear, irradiation, radioactive materials, and the decontamination processes and provide for general maintenance and abrasion service.

The practice of quality assurance for protective coatings applied to the inside of the containment satisfies the requirements of 10 CFR Part 50 Appendix B, ASME NQA-1-2008, and ASTM D3843-00. The records of manufacture's product identity certification, shipping and receiving, warehousing, applicator's material identification, surface preparation and coating application, inspector qualification, daily coating work inspection, and inspector and applicator training are monitored to ensure the quality of Service Level I coatings.

~~As required in the NRC maintenance rule 10 CFR 50.65, the coating program to monitor effectiveness of maintenance for Service Level I coatings includes materials, storage, equipment, application, inspection, and training. The combined license (COL) applicant is to identify the implementation milestones for the coatings program (COL 6.1(1)).~~

### 6.1.3 Combined License Information

~~COL 6.1(1) The COL applicant is to identify the implementation milestones for the coatings program.~~

As required in 10 CFR Part 50, Appendix B, and the NRC Maintenance Rule, 10 CFR 50.65, the coating program to monitor effectiveness of maintenance for safety-related coatings includes materials, storage, equipment, application, inspection, and training. The combined license (COL) applicant is to describe the coating program and to identify the implementation milestones for the coating program (COL 6.1(2)).

### 6.1.4 References

COL 6.1(2) The COL applicant is to describe the coating program and to identify the implementation milestones for the coating program.

1. ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda.
2. ASME Boiler and Pressure Vessel Code, Section II, "Materials," The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda
3. Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.

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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

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

Docket No. 52-046

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Application Section: 6.1.2  
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### **Question No. 06.01.02-7**

The third paragraph in FSAR Section 6.1.2 states that some particulate debris of appreciable size settles to the bottom of the Holdup Volume Tank. Please discuss your plans to revise FSAR Subsection 6.1.2 to address the following:

- This paragraph is inconsistent with the Generic Safety Issue (GSI)-191 analysis, which assumes all coating debris is transported to the emergency core cooling system strainers (FSAR Subsection 6.8.4.5.3). Any non-transport of debris would require a technical justification.
- Instead of a statement about non-transport of particulate, FSAR Subsection 6.1.2 should describe how coatings are evaluated as a potential debris source in addressing GSI-191, or it should identify another FSAR subsection that provides this information.

### **Response**

The statement, "Any particulate debris of appreciable size that occurs either settles to the bottom of the HVT or is trapped by the filter screen at the bottom of the IRWST" will be deleted to be consistent with the GSI-191 analysis.

The evaluation for coatings as a potential debris source in addressing GSI-191 is described in Subsection 6.8.4.5. It will be incorporated in Subsection 6.1.2.

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### **Impact on DCD**

The DCD Subsection 6.1.2 will be revised as indicated in the Attachment.

**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.

**APR1400 DCD TIER 2****6.1.2 Organic Materials**

Organic materials including wood, clothes, plastics, lubricants, and asphalt are not used inside the containment.

The protective coatings used inside the containment, Service Level I, have been demonstrated to withstand design basis conditions and meet the guidance in NRC RG 1.54 (Reference 13).

The evaluation for coatings as a potential debris source in addressing GSI-191 is described in Subsection 6.8.4.5.

~~Any particulate debris of appreciable size that occurs either settles to the bottom of the HVT or is trapped by the filter screen at the bottom of the IRWST.~~

The coatings are able to withstand the harsh conditions of high pressures and temperatures from a combined postulated LOCA and main steam line break (MSLB).

Service Level I coatings, as defined in ASTM D5144-08 (Reference 14), apply to all coatings on structures, equipment, and components inside the containment where the failure of the coatings could adversely affect the operation of post-accident fluid systems and impair a safe shutdown.

The selection of Service Level I coatings is based on ASTM Standards D 5144-08, ASTM D3911-08 (Reference 15), and ASTM D3843-08 (Reference 16). The coatings protect the surfaces of facilities, equipment, and components against corrosion and contamination during plant operation.

The substrate requiring Service Level I coating systems are listed below. A list of applicable coatings per substrates is given in Table 6.1-3.

a. Ferrous metal surfaces

Exposed surfaces of the containment liner plates, equipment hatch and personnel airlocks, structural steels, and miscellaneous steels.

b. Concrete surface