

MCB Issue List for APR1400 FSAR SECTION 9.5.4

Issue #1 (AI 9-45.1)

APR1400 Final Safety Analysis Report (FSAR), Section 9.5.4, references Regulatory Guide 1.137, Rev. 2. No exceptions to RG 1.137 are listed in FSAR Table 1.9-1. RG 1.137, Rev. 2, endorses the 2013 revision of ASTM International (ASTM) Standard D975 (D975-13), "Standard Specification for Diesel Fuel Oils," while FSAR Section 9.5.4, references the 2010 revision. The APR1400 Technical Specifications Bases for Section 3.8 reference D975-13.

Revise FSAR Section 9.5.4 to reference ASTM Standard D975-13, to be consistent with RG 1.137, Rev. 2, as being used for fuel oil specifications.

Response

DCD Tier 2, Section 9.5.11 will be revised to reference the 2013 edition of ASTM Standard D975.

Impact on DCD

DCD, Tier 2, Section 9.5.11 will be revised as indicated on the Attachment.

Impact on PRA

There is no impact on the PRA model.

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 Reports.

APR1400 DCD TIER 2

54. NFPA 37, "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines," National Fire Protection Association, 2010.
55. ASTM D975, "Standard for Diesel Fuel Oils," American Society for Testing and Materials, ~~2010~~.
56. 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," U.S. Nuclear Regulatory Commission.
57. 10 CFR 50.34, "Contents of Applications, technical information," U.S. Nuclear Regulatory Commission.
58. 10 CFR 50.47, "Emergency Plan," U.S. Nuclear Regulatory Commission.
59. 10 CFR 73.46, "Fixed Site Physical Protection Systems, Subsystems, Components and Procedures," U.S. Nuclear Regulatory Commission.
60. 10 CFR 73.55, "Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage," U.S. Nuclear Regulatory Commission.
61. EPRI NP-6559, "Voice Communication Systems Compatible with Respiratory Protection," Electric Power Research Institute, November 1989.
62. Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," Rev. 1, U.S. Nuclear Regulatory Commission, October 1999.
63. EPRI NP-5652, "Guideline for the Utilization of Commercial-Grade Items in Nuclear Safety-Related Applications," Final Report, Electric Power Research Institute, June 1988.
64. EPRI TR-106439, "Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications," Electric Power Research Institute, October 1996.
65. NUREG-0800, Standard Review Plan, Section 9.5.5, "Emergency Diesel Engine Cooling Water System," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.

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Issue #2 (AI 9-45.2)

FSAR Subsection 9.5.4.5 states, "Prior to addition of new fuel oil into the storage tanks, samples will be tested for specific gravity, cloud point, viscosity, and water and sediment content in accordance with ASTM D975." Address the following issues related to the fuel specifications:

- Since ASTM D975 includes several fuel grades, revise the FSAR to identify the grade specifications against which fuel oil will be checked. (APR1400 Technical Specification 5.5.13, "Diesel Fuel Oil Testing Program," identifies it as grade 2D.)
- Since specific gravity is not addressed in D975-13, revise the FSAR to identify the measurement method(s) and acceptance criteria for specific gravity.

Response

In ARP1400 standard design, diesel fuel oil grade for Emergency Diesel Engine Generator is grade No. 2 Diesel in ASTM D975.

The test for American Petroleum institute (API) or specific gravity is performed in accordance with ASTM D1298, Rev. B, 2012 as required in NRC RG 1.137, Rev.2, Position 13.2.

Impact on DCD

DCD, Tier 2, Section 9.5.4.5 and 9.5.11 will be revised as indicated on the Attachment.

Impact on PRA

There is no impact on the PRA model.

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 Reports.

APR1400 DCD TIER 2**9.5.4.5 Inspection and Testing Requirements**

The EDEFOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. The EDEFOS is tested periodically along with the complete EDG system. This test demonstrates the performance, and structural and leaktight integrity, of each system component.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI (Reference 50).

The operability of EDEFOS may be demonstrated during tests of the emergency diesel generator, or testing may be performed by operation of the system in recirculation mode (bypassing day tank) and sending fuel through the recirculation line back to the fuel oil storage tank.

The fuel oil in the storage tank and day tanks is periodically sampled to verify quality as defined in the EDG fuel sampling and testing program. Prior to addition of new fuel oil into the storage tanks, samples will be tested for specific gravity, cloud point, viscosity, and water and sediment content in accordance with ASTM D975 (Reference 55) limits. Accumulated moisture and sediment are removed periodically, via the sump drain, to minimize degradation of the fuel oil.

and D1298 (Reference 82)

The COL applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident (COL 9.5(10)).

Equipment and components are readily available for inspection and maintenance. Provisions are made to pressure test portions of the system. The EDEFOS can be tested independently of each EDG by draining the day tanks to the levels that automatically start the pumps. The pump flow rate is verified by monitoring the day tank level indicators.

The exterior surfaces of the fuel oil storage tanks and day tanks are painted with a primer and finish coat system for corrosion protection. The inspection on the interior surfaces of the tanks is done when the tanks are emptied and cleaned. Buried fuel oil system piping is inspected by means of a visual examination at each end of the buried piping for evidence of leakage.

79. Regulatory Guide 1.137, "Fuel Oil Systems for Nuclear Power Plant," Rev. 3, U.S. Nuclear Regulatory Commission, June 2013.
80. Regulatory Guide 1.32, "Criteria for Power Systems for Nuclear Power Plant," Rev. 3, U.S. Nuclear Regulatory Commission, March 2004.
81. NFPA 101, "Life Safety Code," National Fire Protection Association, 2012.

82. ASTM D1298, "Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method," American Society for Testing and Materials, 2012.

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Issue #3 (AI 09-45.3)

FSAR Subsection 9.5.4.5, states, "The fuel oil in the storage tank and day tanks is periodically sampled to verify quality as defined in the EDG fuel sampling and testing program. If this reference is to Technical Specification 5.5.13, "Diesel Fuel Oil Testing Program," revise FSAR Subsection 9.5.4.5 to clearly state this. If it refers to another program, revise FSAR Subsection 9.5.4.5 to identify and explain the other program.

Response

The EDG fuel sampling and testing program refers to Technical Specification 5.5.13, "Diesel Fuel Oil Testing Program." DCD Tier 2, subsection 9.5.4.5 will be revised to refer to the Technical Specification.

Impact on DCD

DCD Tier 2, subsection 9.5.4.5 will be revised as indicated in the attachment.

Impact on PRA

There is no impact on the PRA model.

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**9.5.4.5 Inspection and Testing Requirements**

The EDEFOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. The EDEFOS is tested periodically along with the complete EDG system. This test demonstrates the performance, and structural and leaktight integrity, of each system component.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI (Reference 50).

The operability of EDEFOS may be demonstrated during tests of the emergency diesel generator, or testing may be performed by operation of the system in recirculation mode (bypassing day tank) and sending fuel through the recirculation line back to the fuel oil storage tank.

Section 5.5.13 of the Technical Specifications (Diesel Fuel Oil Testing Program).

The fuel oil in the storage tank and day tanks is periodically sampled to verify quality as defined in ~~the EDG fuel sampling and testing program~~. Prior to addition of new fuel oil into the storage tanks, samples will be tested for specific gravity, cloud point, viscosity, and water and sediment content in accordance with ASTM D975 (Reference 55) limits. Accumulated moisture and sediment are removed periodically, via the sump drain, to minimize degradation of the fuel oil.

The COL applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident (COL 9.5(10)).

Equipment and components are readily available for inspection and maintenance. Provisions are made to pressure test portions of the system. The EDEFOS can be tested independently of each EDG by draining the day tanks to the levels that automatically start the pumps. The pump flow rate is verified by monitoring the day tank level indicators.

The exterior surfaces of the fuel oil storage tanks and day tanks are painted with a primer and finish coat system for corrosion protection. The inspection on the interior surfaces of the tanks is done when the tanks are emptied and cleaned. Buried fuel oil system piping is inspected by means of a visual examination at each end of the buried piping for evidence of leakage.

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Issue #4 (AI 9-45.4)

FSAR Section 9.5.4 provides information about corrosion protection of piping, tanks, and valves in the diesel fuel oil system. By conforming to the positions in RG 1.137, Rev. 2, without exceptions, the applicant is describing certain practices that are described or referenced in the RG. For example, RG 1.137, Rev. 2, position C.9.1 describes how practices for safety-related coatings should be applied to internal coatings for diesel fuel system components such as tanks. Based on the information in the FSAR, it is not clear to the staff that the design is following these practices. Therefore,

- Revise FSAR Section 9.5.4 to identify safety-related coatings associated with the diesel fuel oil system and state that the practices for these coatings will follow the RG positions.
- The FSAR indicates that there is buried piping in the system, but the information provided does not appear to conform to RG 1.137, Rev. 2. Position C.9.2 in RG 1.137, Rev. 2 states that external coatings should follow the requirements of the 2007 edition of NACE International Standard Practice 0169 (SP0169-2007), "Control of External Corrosion on Underground or Submerged Metal Piping Systems." SP0169-2007 has specific practices for external coatings, including acceptable coating products, cathodic protection, and inspection practices.

FSAR Section 9.5.4 states that for the APR1400 design, visual inspection for evidence of leakage will be implemented as an inspection method to identify external corrosion. However, visual inspection for signs of leakage is not one of the accepted practices in SP0169-2007. Revise FSAR Section 9.5.4 to describe and justify this exception to the RG, or revise the FSAR to describe how the design will conform to the RG.

Response

Internal coatings are not applied to the Diesel Fuel Oil Storage Tanks (DFOSTs). Fuel oil and oil mist in the tanks prevent oxidation of internal surface of the tanks. In addition, the DFOSTs outlet connections are approximately 6 inches above the tanks bottom. This allows for room for any sediment to settle inside the tanks, and each tank is equipped with a drain connection.

Also, Section 6.2.5, "Other Requirements," of ANSI/ANS-59.51-1997 states,

"The use of an internal or external corrosion allowance or a double wall design is an adequate means of meeting the requirements of this section."

In APR1400 design, an internal corrosion allowance is used for internal corrosion protection to the DFOSTs. Also, external coatings are applied to the DFOSTs in accordance with the requirements of service level II of RG 1.54, Rev. 2.

In APR1400 design, there is no buried and underground piping, and the fuel oil storage tanks are located in a room. In DCD Tier 2, Subsection 9.5.4.5, the description on buried piping will be deleted. Therefore, NACE SP0169-2007 is not applied in DCD Tier 2, Section 9.5.4.

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Impact on DCD

DCD, Tier 2, Section 9.5.4.5 will be revised as indicated on the attachment.

Impact on PRA

There is no impact on the PRA model.

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 Reports.

APR1400 DCD TIER 2**9.5.4.5 Inspection and Testing Requirements**

The EDEFOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. The EDEFOS is tested periodically along with the complete EDG system. This test demonstrates the performance, and structural and leaktight integrity, of each system component.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI (Reference 50).

The operability of EDEFOS may be demonstrated during tests of the emergency diesel generator, or testing may be performed by operation of the system in recirculation mode (bypassing day tank) and sending fuel through the recirculation line back to the fuel oil storage tank.

The fuel oil in the storage tank and day tanks is periodically sampled to verify quality as defined in the EDG fuel sampling and testing program. Prior to addition of new fuel oil into the storage tanks, samples will be tested for specific gravity, cloud point, viscosity, and water and sediment content in accordance with ASTM D975 (Reference 55) limits. Accumulated moisture and sediment are removed periodically, via the sump drain, to minimize degradation of the fuel oil.

The COL applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident (COL 9.5(10)).

Equipment and components are readily available for inspection and maintenance. Provisions are made to pressure test portions of the system. The EDEFOS can be tested independently of each EDG by draining the day tanks to the levels that automatically start the pumps. The pump flow rate is verified by monitoring the day tank level indicators.

The exterior surfaces of the fuel oil storage tanks and day tanks are painted with a primer and finish coat system for corrosion protection. The inspection on the interior surfaces of the tanks is done when the tanks are emptied and cleaned. ~~Buried fuel oil system piping is inspected by means of a visual examination at each end of the buried piping for evidence of leakage.~~



delete

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Issue #5 (AI 9-45.5)

FSAR Subsection 9.5.4.5 states, "Accumulated moisture and sediment are removed periodically," but it does not reflect the fact that there is a maximum period specified in the Technical Specifications to check for and remove accumulated water (31 days according to Surveillance Requirement 3.8.3.5). In addition, RG 1.137, Rev. 2, Position 13.5 states that accumulated water in day tanks should be removed immediately.

Revise FSAR Subsection 9.5.4.5 to clarify that checking for water and removing it is done in accordance with the technical specifications and regulatory guide.

Response

Accumulated moisture and sediment are checked for and removed every 31 days in accordance Technical Specifications (TS), Surveillance Requirement (SR) 3.8.3.5. DCD Subsection 9.5.4.5 will be revised to reflect that.

Impact on DCD

DCD, Tier 2, Section 9.5.4.5 will be revised as indicated on the attachment.

Impact on PRA

There is no impact on the PRA model.

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 Reports.

APR1400 DCD TIER 2**9.5.4.5 Inspection and Testing Requirements**

The EDEFOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. The EDEFOS is tested periodically along with the complete EDG system. This test demonstrates the performance, and structural and leaktight integrity, of each system component.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI (Reference 50).

The operability of EDEFOS may be demonstrated during tests of the emergency diesel generator, or testing may be performed by operation of the system in recirculation mode (bypassing day tank) and sending fuel through the recirculation line back to the fuel oil storage tank.

The fuel oil in the storage tank and day tanks is periodically sampled to verify quality as defined in the EDG fuel sampling and testing program. Prior to addition of new fuel oil into the storage tanks, samples will be tested for specific gravity, cloud point, viscosity, and water and sediment content in accordance with ASTM D975 (Reference 55) limits. Accumulated moisture and sediment are removed ~~periodically~~, via the sump drain, to minimize degradation of the fuel oil.

in accordance with Surveillance Requirement 3.8.3.5,

The COL applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident (COL 9.5(10)).

Equipment and components are readily available for inspection and maintenance. Provisions are made to pressure test portions of the system. The EDEFOS can be tested independently of each EDG by draining the day tanks to the levels that automatically start the pumps. The pump flow rate is verified by monitoring the day tank level indicators.

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Issue #6 (AI 9-45.6)

FSAR Subsection 9.5.4.5 refers generally to periodic inspection of storage and day tanks when they are emptied and cleaned. This does not reflect the fact that the guidance in RG 1.137, Rev. 2, Position C.13.6 is for a 10-year maximum interval between such inspections.

Revise the FSAR to clarify that emptying, cleaning, and inspecting the tanks is done in accordance with RG 1.137, Rev. 2 or justify an exception.

Response

The inspection on the interior surfaces of the tanks is done when the tanks are emptied and cleaned at 10 year intervals in accordance with RG 1.137, Rev. 2. DCD Section 9.5.4.5 will be revised.

Impact on DCD

DCD, Tier 2, Section 9.5.4.5 will be revised as indicated on the attachment.

Impact on PRA

There is no impact on the PRA model.

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 Reports.

APR1400 DCD TIER 2**9.5.4.5 Inspection and Testing Requirements**

The EDEFOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. The EDEFOS is tested periodically along with the complete EDG system. This test demonstrates the performance, and structural and leaktight integrity, of each system component.

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at least once every 10 years.