ArevaEPRDCPEm Resource

From: BRYAN Martin (EXT) [Martin.Bryan.ext@areva.com]
Sent: Thursday, May 06, 2010 11:29 AM
To: Tesfaye, Getachew
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); NOXON David B (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 359 (4259), FSAR Ch. 11 OPEN ITEM, Supplement 1
Attachments: RAI 359 Supplement 1 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided a schedule for the one question on April 5, 2009. The attached file, "RAI 359 Supplement 1 Response US EPR DC.pdf" provides a technically correct and complete responses to the one question, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 359 Question 11.02-18.

The following table indicates the respective pages in the response document, "RAI 359 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 359 — 11.02-18	2	3

This concludes the formal AREVA NP response to RAI 359, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (EXT)
Sent: Monday, April 05, 2010 12:28 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); NOXON David B (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 359 (4259), FSAR Ch. 11 OPEN ITEM

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 359 Response US EPR DC.pdf," provides the schedule for a technically correct and complete response to the one question.

The following table indicates the respective pages in the response document, "RAI 359 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 359 — 11.02-18	2	2

The schedule for technically correct and complete response to this question is provided below.

Question #	Response Date
RAI 359 — 11.02-18	May 7, 2010

Sincerely,

Martin (Marty) C. Bryan
Licensing Advisory Engineer
AREVA NP Inc.
Tel: (434) 832-3016
Martin.Bryan@areva.com

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Monday, March 01, 2010 4:28 PM
To: ZZ-DL-A-USEPR-DL
Cc: Dehmel, Jean-Claude; Roach, Edward; Jennings, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 359 (4259), FSAR Ch. 11 OPEN ITEM

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 22, 2010, and on March 1, 2010, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The question in this RAI is an OPEN ITEM in the safety evaluation report for Chapter 11 for Phases 2 and 3 reviews. As such, the schedule we have established for your application assumes technically correct and complete responses prior to the start of Phase 4 review. For any RAI that cannot be answered prior to the start of Phase 4 review, it is expected that a date for receipt of this information will be provided so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 1390

Mail Envelope Properties (BC417D9255991046A37DD56CF597DB71060F6A72)

Subject: Response to U.S. EPR Design Certification Application RAI No. 359 (4259), FSAR Ch. 11 OPEN ITEM, Supplement 1
Sent Date: 5/6/2010 11:29:03 AM
Received Date: 5/6/2010 11:29:20 AM
From: BRYAN Martin (EXT)

Created By: Martin.Bryan.ext@areva.com

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Return Notification: No
Reply Requested: No
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Expiration Date:
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Response to

Request for Additional Information No. 359 (4259), Revision 1, Supplement 1

3/1/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 11.02 - Liquid Waste Management System
Application Section: 11.2.3.8

QUESTIONS for Health Physics Branch (CHPB)

Question 11.02-18:

OPEN ITEM

A review of FSAR Tier 2, Rev. 1, Section 11.2.3.8 indicates that the quality assurance program for the design, fabrication, procurement, and installation of the LWMS meets the guidance of RG 1.143. The commitment also refers to FSAR Tier 2, Section 17 for a description, which in turn refers to Areva Topical Report ANP-10266A (AREVA NP Inc., Quality Assurance Plan (QAP) for Design Certification of the U.S. EPR, Rev.1, April 2007). A review of FSAR Section 17.2 indicates that the construction phase and operations of the U.S. EPR are not applicable in the context of its design certification; FSAR Section 17.4 is devoted to the reliability program; and FSAR Section 17.5 relies on the Areva Topical Report in describing the quality assurance program. A review of Areva Topical Report, Appendix B (Regulatory Commitments: Compliance with Applicable Regulatory Guides, Generic Letters, and Standards) indicates that RG 1.143 is not listed among the cited documents. Note that although Appendix B refers to RGs 1.26 and 1.29, these two RGs do not apply to radioactive waste management systems, as stated in both RGs. Given the above, the staff concludes that FSAR Tier 2, Section 11.2.3.8 makes a design commitment for the LWMS that is not supported by FSAR Tier 2, Sections 11.2 and 17 and Areva Topical Report ANP-10266A. The applicant is requested to consider the following and make appropriate revisions to the FSAR Tier 2, Sections 11.2 and 11.7. Specifically:

1. revise Appendix B of Areva Topical Report ANP-10266A by including RG 1.143 in the list of documents.

2. describe in FSAR Tier 2, Section 11.2.3.8 the elements of QAP and identify related COL information item(s) that address the design, fabrication, procurement, and installation of the LWMS based on the guidance of RG 1.143.

3. make the corresponding changes to the QA discussion of FSAR Tier 2, Section 11.3.3.7 for the GWMS.

4. add a new subsection containing the corresponding commitment to FSAR Tier 2, Section 11.4 for the SWMS, as FSAR Section 11.4 has no parallel QA discussion that address the fabrication, procurement, and installation of the SWMS based on the guidance of RG 1.143.

Response to Question 11.02-18:

1. As shown in U.S.EPR FSAR Tier 2 Table 1.9-2, the U.S. EPR radwaste systems conform to RG 1.143, Revision 2. U.S. EPR Tier 2, Table 3.2.2-1 specifies the seismic, safety, and quality group classification for radwaste systems consistent with RG 1.143. With this classification and the stated conformance to RG 1.143, the design, fabrication, procurement, and installation activities associated with the radwaste systems, structures and components conform to the quality control provisions of the codes and standards as specified in RG 1.143. U.S. EPR FSAR Tier 2, Sections 11.2.3.8 and 11.3.3.7 will be revised to delete the reference to Chapter 17 for a description of RG 1.143 compliance. Topical report ANP-10266A will not be revised.

2. As stated in item 1, the Liquid Waste Management System (LWMS) will conform to RG 1.143. U.S. EPR FSAR Tier 2, Section 11.2.3.8 will be revised to delete the reference to Chapter 17 for a description of RG 1.143 compliance. As stated in U.S. EPR Tier 2, Section

17.2: “A COL applicant that references the U.S. EPR design certification will provide the Quality Assurance Programs associated with the construction and operations phases."

3. As stated in Item 1, the Gaseous Waste Management System (GWMS) will conform to RG 1.143. U.S. EPR FSAR Tier 2, Section 11.3.3.7 will be revised to delete the reference to Chapter 17 for a description of RG 1.143 compliance. As stated in U.S. EPR Tier 2, Section 17.2: “A COL applicant that references the U.S. EPR design certification will provide the Quality Assurance Programs associated with the construction and operations phases."

4. A section will be added to U.S. EPR FSAR Tier 2, Section 11.4 to discuss the Solid Waste Management System (SWMS) conformance to RG 1.143 Revision 2 with regard to fabrication, procurement, and installation.

FSAR Impact:

U.S. EPR FSAR, Tier 2, Sections 11.2.3.8, 11.3.3.7 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR, Tier 2, Section 11.4.6 will be added as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

11.2.3.6 Radioactive Liquid Waste System Leak or Failure

The U.S. EPR liquid waste management system receives degasified liquids in the storage tanks. These tanks are continuously vented to the radioactive waste processing building ventilation system (refer to Section 9.4.8) so that any generation of gaseous activity is continually removed. Thus, no significant levels of gaseous activity from a liquid waste system leak or failure is expected. An evaluation later in this section addresses the radiological consequences of the leak or failure of a tank containing radioactive liquids from the liquid waste management system.

11.2.3.7 Postulated Radioactive Releases due to Liquid-Containing Tank Failures

The U.S. EPR incorporates design features to prevent the contamination of the facility and the environment consistent with the requirements of 10 CFR 20.1406 (refer to Section 12.3.6). In the unlikely event of a liquid waste storage tank failure, with resulting release to the environment, the contamination travels via ground water to the nearest water source. The U.S. EPR meets the concentration limits of 10 CFR Part 20, Appendix B, as shown in Table 11.2-8—Unrestricted Area Water Concentration from Unmitigated Liquid Release, in accordance with NUREG-0800, BTP 11-6 (Reference 3). This calculation is based on:

- A distance of 1200 feet from the Auxiliary Building to the unrestricted area.
- A travel rate of 0.0012 feet/day for cesium and strontium, and 0.083 feet/day for nuclides other than cesium and strontium.
- The presence of hydrogen-3, iron-55, and cobalt-60 as the only significant nuclides at the unrestricted area due to half-lives relative to travel time.
- Discharge concentrations are at a location in the immediate vicinity of the discharge point.
- Discharge concentrations are based on a dilution flow rate of 9000 gpm.

As addressed in Section 11.5.2, the COL applicant will fully describe the elements of the Radioactive Effluent Monitoring Program (REMP) as part of the Offsite Dose Calculation Manual (ODCM). The REMP will reflect recent nuclear industry initiatives and NRC assessments of existing nuclear reactors related to groundwater contamination and monitoring.

11.2.3.8 Quality Assurance

11.02-18

The quality assurance program governing design, fabrication, procurement, and installation of the liquid waste storage and processing systems ~~meets the requirements of~~conform to RG 1.143, as ~~described in Chapter 17~~indicated in Table 3.2.2-1. Implementation of the quality assurance program is described in Chapter 17.

gases and iodine isotopes is controlled by Technical Specifications (TS). Corrosion products are not affected by the percentage of fuel defects and do not need a multiplication factor. Similarly, Carbon-14 and Argon-41 release rates are also independent of fuel defect level. Tritium is adjusted using the ratio of the primary coolant activity for maximum failed fuel defect (1 percent failed fuel) to expected primary coolant concentration. The release rate for all other isotopes is conservatively adjusted upward by a factor of 1,000.~~the ratio of design basis fuel failure primary coolant activity to expected fuel failure primary coolant activity, except for specific radionuclides in which Technical Specifications (TS) limit the maximum primary coolant activity~~. The results of the design basis case are also presented in Table 11.3-6. For the annual average radionuclide release concentrations for design basis (one percent failed fuel) releases, the overall fraction of the effluent concentration limit is 0.10, which is well below the allowable value of 1.0.

For both normal and maximum defined fuel failure cases, individual site boundary concentrations for the U.S. EPR are less than the applicable limits specified in 10 CFR Part 20, Appendix B, Table 2.

11.3.3.6 Radioactive Gaseous Waste System Leak or Failure

The purge system of the gaseous waste processing system operates at sub-atmospheric pressures, thus preventing leakage from the purge section to the building atmosphere. The positive pressure section of the system is designed to be leak tight, thus limiting the potential for leakage. The leak tightness of the system is verified by pre-operational testing as described in Section 11.3.2.5.2.

The gaseous waste processing system is capable of detecting leaks by monitoring the system operating parameters for abnormalities. For example, if a leak were to exist in the purge section of the system. the upstream O_2 instrument would detect a higher than normal oxygen concentration due to building air ingress. If a leak were to exist in the positive pressure section, the system instrumentation would indicate flow rates and pressures outside the normal operating range. Once identified through system instrumentation and controls (I&C), the operator can take appropriate action to isolate the leak.

A bounding analysis was performed for the hypothetical event where an operator error leads to an inadvertent bypass of the delay beds and the exhaust from the coolant degasification system is released directly to the environment. Based on a one-hour release to the environment, the exposure at the exclusion area boundary is less than 0.1 rem, in accordance with BTP 11-5 (Reference 3).

11.3.3.7 Quality Assurance

11.02-18

The quality assurance program governing design, fabrication, procurement, and installation of the gaseous waste processing system ~~meets the requirements of~~

conforms to RG 1.143 as ~~described in Chapter 17~~indicated in Table 3.2.2-1. Implementation of the quality assurance program is described in Chapter 17. For the containment isolation valves and associated piping, the quality assurance program meets the requirements of Appendix B to 10 CFR Part 50 and Section III-ND of the ASME Boiler and Pressure Vessel Code (Reference 4).

11.3.4 Gaseous Waste Management System Cost-Benefit Analysis

10 CFR Part 50, Appendix I requires that plant designs consider additional items based on a cost-benefit analysis. Specifically, the design must include all items of reasonably demonstrated cleanup technology that, when added to the gaseous waste processing system sequentially and in order of diminishing cost-benefit return, can, at a favorable cost-benefit ratio, reduce the dose to the population reasonably expected to be within 50 miles of the reactor. The cost-benefit analysis presented in this section is for a typical site and results demonstrate that additional cleanup technology is not warranted. A COL applicant that references the U.S. EPR design certification will confirm that the gaseous waste management system cost-benefit analysis for the typical site is applicable to their site; if it is not, provide a site-specific cost-benefit analysis.

The next logical gaseous waste processing component for the U.S. EPR is the addition of a charcoal delay bed to the waste gas holdup subsystem. The original design contains three delay bed vessels, and the augmented design contains four delay bed vessels. All other features and parameters of the system are assumed to remain the same.

11.3.4.1 Calculation of Population Doses

The source term for each equipment configuration option in this analysis was generated using the NUREG-0017 GALE code (Reference 1) and system parameters from Table 11.2.3. All input parameters to the GALE code (Reference 1) are the same for the base and augmented cases except for those parameters affected by the addition of a delay bed. The only GALE (Reference 1) input parameters affected by the design change are the holdup times for krypton and xenon. Holdup times are increased in proportion to the increase in mass of charcoal adsorber.

The GASPAR II code (Reference 2) was used to determine the population doses for both cases. Input parameters are given in Table 11.3-7~~4~~. GASPAR II (Reference 2) input values for a typical site were used. These parameters include data within 50 miles of the reactor for population, meteorological dispersion, milk production, meat production, and vegetable production. Although entered by sector and distance for the actual analysis, total values for population and production data are provided in Table 11.3-~~4~~7.

cost-benefit return, can, at a favorable cost-benefit ratio, reduce the dose to the population reasonably expected to be within 50 miles of the reactor.

There is no separate cost-benefit analyses performed for the SWMS since there are no releases of solid radioactive waste other than those shipped offsite for disposal. Any radioactive liquid and gases generated as a result of the operation of the SWMS are evaluated as a part of the liquid and gaseous cost-benefit analyses in Sections 11.2 and 11.3, respectively.

11.4.5 Failure Tolerance

There are no requirements to design the systems against single failure criterion or multiple component train separation. The following internal hazards, however, are considered in the system design:

- Load drop. If a filled drum is dropped, the drum may split and spill its contents on the floor. Personnel protective equipment is required (protective clothing, respirators, etc.) when cleaning up spilled contamination. Potential airborne contamination is removed and treated by the Radioactive Waste Processing Building ventilation exhaust system to prevent airborne activity from spreading into the environment.

- Fire. Storage drums are sealed with lids after filling; a sealed drum can contain a fire long enough for operators to extinguish the fire before it spreads to other drums or areas. In the event of a fire in one of the drums, fire and smoke detectors provide an alarm to alert the operators. The room ventilation supply and exhaust dampers are closed to isolate the room until the fire is extinguished. Then, potential airborne contamination and smoke is removed and treated by the Radioactive Waste Processing Building ventilation exhaust system to prevent airborne activity from spreading into the environment.

The solid radioactive waste management systems are not designed for safe shutdown in an earthquake nor is protection against an explosion pressure wave required. Protection against external hazards is also not required.

11.02-18

11.4.6 Quality Assurance

The quality assurance program governing design, fabrication, procurement, and installation of the solid waste management system conforms to RG 1.143 as indicated in Table 3.2.2-1. Implementation of the quality assurance program is described in Chapter 17.

11.4.7 References

1. NUREG-0800, BTP 11-3, "Design Guidance For Solid Radioactive Waste Management Systems Installed In Light-Water-Cooled Nuclear Power Reactor Plants," Revision 3, U.S. Nuclear Regulatory Commission, March 2007.