AP1000DCDFileNPEm Resource

From: Adams II, Samuel L. [adamssl@westinghouse.com]
Sent: Tuesday, May 20, 2008 10:55 AM
To: Sikhindra Mitra
Cc: Perry Buckberg; Rhonda Carmon
Subject: FW: RAIs -AP1000 DCD Rev. 16 Chapter 11 and 12
Attachments: RAIs.doc; RAIsfordiscussion (2).doc; CH12RAIs.doc

Hi S.K.,

I acknowledge receipt of that attached RAIs on Chapter 11 and 12.

I will let you know as soon as possible if a clarification call is necessary.

Thanks.

Sam

From: Sikhindra Mitra [mailto:Sikhindra.Mitra@nrc.gov]
Sent: Friday, May 16, 2008 3:26 PM
To: Adams II, Samuel L.
Cc: Eileen McKenna; Rhonda Carmon; David Jaffe; Serita Sanders; Perry Buckberg
Subject: RAIs -AP1000 DCD Rev. 16 Chapter 11 and 12

Hi Sam,

Please find attached RAIs for the Chapter 11 and 12.

1) The first file (RAIs.doc) consists of five RAIs. The first three RAIs (RAI-SRP 11.2-CHPB-01, 02, 03) was sent to you on April 24, 2008. They are unchanged. **Additional two RAIs** (RAI-SRP-11.2-CHPB-06 and 07) are included this time.

2) The next file (RAIsfordiscussion (2).doc) consists of Seven RAIs (RAI-SRP 11.1-CHPB-01, RAI 11.2-CHPB-04, 05,RAI-SRP 11.3-CHPB-01, 02, RAI-SRP 11.5-CHPB-01, 02), was also sent to you on April 24, 2008. I am resending them again because these RAIs are **revised**. Most of the revisions except RAI-SRP.2-CHPB-05 are editorial type. RAI-SRP.2-CHPB-05 is on same subject but revised substantially.

3) The last file (CH12RAIs.doc) consists of **three new RAIs** on Chapter 12, which were never sent it to you.

Please acknowledge the receipt of the attached RAIs and let me know if a clarification call is necessary.

Thanks

Sikhindra (S.K) Mitra
Project Manager
AP1000 Project Branch 2 (NWE2)
301-415-2783

Hearing Identifier: AP1000_DCD_Review
Email Number: 44

Mail Envelope Properties (9950B72C4C6D8D43958795C414DE477A062B216A)

Subject: FW: RAIs -AP1000 DCD Rev. 16 Chapter 11 and 12
Sent Date: 5/20/2008 10:55:16 AM
Received Date: 5/20/2008 10:55:27 AM
From: Adams II, Samuel L.

Created By: adamssl@westinghouse.com

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Files	**Size**	**Date & Time**
MESSAGE	1541	5/20/2008 10:55:27 AM
RAIs.doc	26688	
RAIsfordiscussion (2).doc	41536	
CH12RAIs.doc	32832	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Requests for Additional Information (RAIs)
Chapter 11 of the AP1000 Design Certification Document (DCD)
Revision 16

RAI-SRP11.2-CHPB-01
The revision to section 11.2.3.3, Dilution Factor, omitted compliance with the annual offsite dose limits in 10 CFR 50 Appendix I. The DCD states that the plant operator will select dilution flow rates to ensure that the effluent concentration limits of 10 CFR 20 and any local requirements are continuously met. Plant operators must also ensure that the annual releases are within the dose limits of Appendix I which in some situations may be the limiting case. Please revise this section of the DCD to include compliance with 10 CFR 50 Appendix I, Section II.A.

RAI-SRP11.2-CHPB-02
The revision of section 11.2.3.5 states that the estimated doses from liquid effluents are site specific and discussed in 11.2.5. Section 11.2.5 only states that the combined license applicant will provide a site specific cost-benefit analysis to address the requirements of 10 CFR 50, Appendix I, Section II.D regarding population doses due to liquid effluents. The combined license applicant must also comply to individual dose limits to members of the public in 10 CFR 50 Appendix I and 10 CFR 20.1301(e). Please revise section 11.2.5 to include these individual dose limit requirements.

RAI-SRP11.2-CHPB-03
There is an inconsistency between the Estimated Doses sections in section 11.2 (Liquid Waste Management System) and 11.3 (Gaseous Waste Management System). No individual doses were calculated for liquid effluents, but doses were calculated for gaseous releases. Please revise the DCD to include doses from liquid effluents in conformance with Section II.A of Appendix I to Part 50.

RAI SRP-11.2 CHPB-06
In DCD Section 11.2 the staff noted system operation calls for processed water to enter monitor tanks including the three additional liquid waste monitor tanks housed in the radwaste building. The description of system operation calls for the "The contents of the monitor tank are recirculated and sampled. In the unlikely event of high radioactivity, the tank contents are returned to a waste holdup tank for additional processing." Hence, a potential exists for a high radioactivity to be present in the non-seismically designed portion of the liquid waste management system housed in the non-seismically designed radwaste building.

The staff concluded that the description of the design provided in DCD Section 11.2 did not meet the SRP Section 11.2 acceptance criterion 3, which states in part "The seismic design of structures housing LWMS components, the quality group classification of liquid radwaste treatment equipment should conform to the guidelines of Regulatory Guide 1.143 for liquids and liquid wastes produced during normal operation and anticipated operational occurrences." The regulatory position proved in Section C.5.3 of Regulatory Guide 1.143 states in part "Any systems or components in a RW-IIa facility (see Regulatory Position 5.1) that store, process, or handle radioactive waste in excess of the A_1 quantities given in Appendix A, "Determination of A_1 and A_2," to 10 CFR Part 71, "Packaging and Transportation of Radioactive Material," are classified as RW-IIa." Since the proposed design change does not include verification that the radionuclides quantities do not exceed the A_1 values, a potential for exceedance exists. Therefore, portions of the liquid waste management system housed in the radwaste building in

order to conform to RG 1.143 should be classified as RW-IIa SSCs and not RW-IIc as stated in DCD Appendix 1A.

Provide a complete description of the how the placement of three additional liquid waste monitor tanks and associated equipment in the radwaste building meets acceptance criterion 3 of SRP Section 11.2. Include this information in the DCD and TR-116 and provide a markup in your response.

RAI SRP-11.2 CHPB-07

In DCD Section 3.2, Table 3.2-3, Sheets 63 and 64, the staff noted that the three new liquid waste monitor tanks and associated equipment for the liquid radwaste system were not added to this table. Additionally, in Table 3.2-3, the applicant did not identify the new WLS piping interconnecting the auxiliary and radwaste buildings and its classification.

In accordance with 10 CFR 50.34a, the applicant is to provide sufficient design information to demonstrate that design objectives for equipment necessary to control releases of radioactive effluents in the environment. Also, in accordance with 10 CFR 52.47(a)(2), the applicant must include performance requirements and design information sufficiently detailed to permit the preparation of acceptance and inspection requirements by the NRC, and procurement specifications and construction and installation specifications by an applicant.

Provide classification information for the three new liquid waste monitor tanks and associated equipment. Include this information in the DCD and TR-116 and provide a markup in your response.

Requests for Additional Information (RAIs)
Chapter 11 of the AP1000 Design Certification Document (DCD)
Missing Information in Revision 15

The following RAIs address topics and information that should be included in the Design Certification Document but were not addressed in the approved Revision 15 or the current Revision 16. CHPB believes that there are compelling reasons to include this information in the new revision of the DCD and would like to discuss these with NRC Project Management and the applicant.

Section 11.1

RAI-SRP11.1-CHPB-01
What are the Tc-99 concentrations in the primary and secondary coolant under design basis and realistic conditions? Please add these concentrations to the appropriate tables in section 11.1 and provide the technical basis for these concentrations.

The lack of Tc-99 concentration data in the secondary coolant has caused a problem with the staff and applicants who are performing dose consequence analysis for the liquid radwaste system failures. Note that SRP section 2.4.13 states that this assessment must consider the "most adverse" contamination in groundwater. Tc-99 concentrations are needed to perform the liquid radioactive waste system failure analysis for groundwater specified in SRPs 11.2(BTP-11-6) and 2.4.13. Tc-99, which is produced in the reactor core in amounts several orders of magnitude greater than I-129, becomes an important contributor to dose from groundwater because of its long half life and low retardation in soil. Without the Tc-99 concentrations, the consequence analysis is incomplete because it's missing one of the major contributors to dose and the staff cannot determine whether the applicant met the design criteria. This change is necessary under 10 CFR 52.63 (a)(1)(ii), and (v) to provide adequate protection of the public health and safety, and to correct material errors in the certification information.

Section 11.2

RAI-SRP11.2-CHPB-04
Section 11.2.3 is missing the consequence evaluation of a liquid waste tank failure. The acceptance criteria in SRP 11.2 require this evaluation and rely on the approach specified in Branch Technical Position 11-6. Please provide this analysis and revise the DCD accordingly. Also provide sufficient details for the staff to perform an independent confirmatory analysis.

The staff needs to determine that the applicant met the requirements of General design Criteria 60 and 61 with respect to the control of releases of radioactive materials released to the environment by providing controls to reduce the potential impact of the failure of the radioactive liquid waste system and its associated components. Without this analysis, the staff cannot assure that the applicant met the design criteria.

In addition, the staff needs the results of this analysis to determine the classification of the radioactive waste system for design purposes. Regulatory position C.5 in Regulatory Guide 1.143 uses estimated doses from system failures to classify the design hazard of the waste management system. Based on this design hazard classification, the building containing the radwaste system and the system itself must comply with certain design standards specified in the Regulatory Guide. Without this analysis, the staff can not determine the proper design

classification and applicable design standards. This rationale also applies to classifying the design hazard of the 3 new monitoring tanks housed in the radwaste building specified in Revision 16 of the DCD.

10 CFR 52.63 allows for this change to the DCD. This change is necessary under 10 CFR 52.63 (a)(1)(ii), and (v) to provide adequate protection of the public health and safety, and to correct material errors in the certification information.

RAI-SRP11.2-CHPB-05
Section 11.2.4, Preoperational Testing, does not address the testing and inspection of ion exchange resin. The initial performance of the liquid radioactive waste systems depends on the existence and performance of ion exchange resin in the ion exchange vessels. Westinghouse based the annual liquid effluent release of radioactivity estimated in section 11.2 on assuming the media provided a specific level of decontamination as listed in Table 11.2-5. What types of preoperational testing and inspection will be performed to ensure that the resin is properly installed and performing to assumed levels at initial start up? Please revise Tier 2 Section 11.2.4 and Tier 1 Section 2.3.10 of the DCD and to include a description of the preoperational testing of the ion exchangers. The applicant states how they intend to verify the performance of the charcoal in the gaseous waste delay beds in section 11.3.4 for the gaseous waste management system. A similar description for the liquid system ion exchangers in 11.2.4 and Tier 1 Section 2.3.10 would be an acceptable response.

This preoperational test and ITAAC is necessary because compliance with Parts 20 and 50, and the plant Technical Specifications is based on the performance of the ion exchangers. The applicant states in Section 14.3.2.1 that if the answer is yes to the following questions, then design description and ITAAC are prepared using the appropriate functions stated in the Tier 2 material and the parameters from the system design calculations:

- Are any features or functions necessary to satisfy the NRC's regulations in Parts 20, 50, 52, 73 and 100?
- Are any features or functions the subject of a provision in the Technical Specifications?

When demonstrating compliance with effluent release requirements in Part 20, 50 and Technical Specifications, the applicant assumed a certain level of performance for the ion exchangers (see Table 11.2.5). A preoperational test must be performed to assure that the exchangers will performed as designed.

This change is necessary under 10 CFR 52.63 (a)(1)(ii), (iv) and (v) to provide adequate protection of the public health and safety, to provide detailed design information to be verified under those inspections, tests, analyses, and acceptance criteria (ITAAC), and to correct material errors in the certification information.

<u>Section 11.3</u>

RAI-SRP11.3-CHPB-01
The dose estimation in section 11.3.3.4, Estimated Doses, is incomplete. Table 1 in Regulatory Guide 1.109 requires the calculation of following doses from releases to the atmosphere to demonstrate compliance with the design objectives of 10 CFR 50 Appendix I, sections II.B and II.C:

- beta and gamma air exposures from noble gases

- total body and skin doses from noble gases
- organ doses from radioiodines and particulates

In order to satisfy the requirements of Appendix I, please provide an analysis demonstrating compliance to the total body and skin dose criteria for noble gases and organ dose criteria for radioiodines and particulates. Please incorporate this analysis into the DCD and also include a statement that the COL applicant must perform individual dose calculations as well, given plant and site specific conditions. The applicant must also provide sufficient details for the staff to perform an independent confirmatory analysis.

In order for the staff to state that they comply with GD 60 and SRP section 11.3 acceptance criteria we need a complete analysis of doses including doses to air from noble gases, doses to total body and skin from noble gases and organ doses from iodine and particles. This change is necessary under 10 CFR 52.63 (a)(1)(ii), and (v) to provide adequate protection of the public health and safety, and to correct material errors in the certification information. In addition, this information is necessary to completely demonstrate compliance with 10 CFR 50 Appendix I, section II.B. and II.C.

RAI-SRP11.3-CHPB-02
Section 11.3.3 is missing the consequence evaluation of a gaseous waste system leak or failure. The acceptance criteria in SRP 11.3 require this evaluation and rely on the approach specified in Branch Technical Position 11-5. Based on the SER for Revision 15, the applicant performed this analysis in response to an RAI, but the description of the analysis and results were not included in the DCD. The applicant should add its analysis to the DCD and provide sufficient detail for the staff to perform an independent analysis.

The staff needs the results of this analysis to determine the classification of the radioactive waste system for design purposes. Regulatory position C.5 in Regulatory Guide 1.143 uses estimated doses from system failures to classify the design hazard of the waste management system. Based on this design hazard classification, the building containing the radwaste system and the system itself must comply with specific design standards described in the Regulatory Guide. Without this analysis, the staff can not determine the proper design classification and applicable design standards.

10 CFR 52.63 allows for this change to the DCD. This change is necessary under 10 CFR 52.63 (a)(1)(ii), and (v) to provide adequate protection of the public health and safety, and to correct material errors in the certification information.

<u>Section 11.5</u>

RAI-SRP11.5-CHPB-01
Section 11.5 states that the radiation monitoring system is designed in accordance with ANSI N13.1-1969. This standard has been updated in 1999 because the approach taken in the 1969 does not provide assurance that the sample in the effluent vent will be representative. The 1999 revision to ANSI N13.1 differs significantly from the earlier version in that it is now performance based. SRP 11.5 (2007) uses the 1999 standard as acceptance criteria. Please provide an evaluation that proves that the location of duct monitors and/or sampling points for airborne radioactivity are designed according to ANSI/HPS N13.1-1999 and provide a commitment in the DCD that the 1999 standard will be followed.

The 1969 standard does not provide assurance that the sample from the effluent vent is representative of the particulate matter and reactive vapors passing through the vent. Given that many important decisions pertaining to public and occupational exposure to radioactivity are made from the measurements, we need to use the new standard to ensure that the measurements are accurate.

10 CFR 52.63 allows for this change to the DCD. This change is necessary under 10 CFR 52.63 (a)(1)(ii), and (v) to provide adequate protection of the public health and safety, and to correct material errors in the certification information.

RAI-SRP11.5-CHPB-02
Will the continuous effluent monitors for both liquid and gaseous effluent conform to ANSI N42.18-2004? There is no mention of this standard or its predecessor (ANSI N13.10-1974) in the entire section 11.5. SRP 11.5 uses this standard to evaluate equipment design features to ensure representative sampling and monitoring. Please provide in the DCD a commitment to follow this standard.

Without a commitment to this standard, the staff has no assurance that the measurements will be accurate and scientifically proven to be representative. Given that many important decisions pertaining to public and occupational exposure to radioactivity are made from such measurements, the DCD needs to commit to the current standard to ensure that the measurements are accurate.

10 CFR 52.63 allows for this change to the DCD. This change is necessary under 10 CFR 52.63 (a)(1)(ii), and (v) to provide adequate protection of the public health and safety, and to correct material errors in the certification information.

Requests for Additional Information (RAIs)
Chapter 12 of the AP1000 Design Certification Document (DCD)
Revision 16

RAI-SRP12.1-CHPB-01

Describe specific examples of the design and operational considerations which demonstrate compliance with 10CFR20.1406? Please identify add these considerations to the appropriate DCD sections in the AP1000DCD and provide the basis for these considerations.

The staff has developed Regulatory Guide 4.21 (issued in draft as DG-4012) in order to provide guidance to the industry on how to meet the requirements of 10 CFR 20.1406 with respect to minimizing, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste.

Included in this guidance are design and operational objectives, such as the following:

1) Minimize leaks and spills and provide containment in areas where such events may occur,
2) Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage,
3) Use leak detection instrumentation capable of detecting minor leaks in areas where it is difficult or impossible to conduct regular inspections (such as for spent fuel pools, tanks that are in contact with the ground, and buried, embedded, or subterranean piping) to avoid release of contamination from undetected leaks,
4) Reduce the need to decontaminate equipment and structures by decreasing the probability of any release, reducing any amounts released, and decreasing the spread of the contaminant from the source,
5) Provide for early detection of leakage and contamination migration to minimize contamination of the environment,
6) Periodically review operational practices to ensure that, operating procedures are revised to reflect the installation of new or modified equipment, personnel qualification and training are kept current, and facility personnel are following the operating procedures,
7) Facilitate decommissioning by a) maintenance of records relating to facility design and construction, facility design changes, site conditions before and after construction, onsite waste disposal and contamination and results of radiological surveys, b) minimizing embedded and buried piping, and c) designing the facility to facilitate the removal of any equipment and/or components that may require removal and/or replacement during facility operation or decommissioning,
8) Minimize the generation and volume of radioactive waste both during operation and during decommissioning (by minimizing the volume of components and structures that become contaminated during plant operation)
9) Develop a conceptual site model (based on site characterization and facility design and construction) which will aid in the understanding of the interface with environmental systems and the features that will control the movement of contamination in the environment,

10) Evaluate the final site configuration after construction to assist in preventing the migration of radio-nuclides offsite via unmonitored pathways,

a) Using the guidance provided by Appendix A of RG 4.21, for all of the listed design objectives (numbers 1-5, 7 b & c, and 8), provide (in Section 12.3 or other appropriate section of the DCD) several examples of AP1000 design features that illustrate how each of these objectives are met by the AP1000 design. For those objectives which are more operational (numbers 6 and 7 a) or procedural (numbers 9 and 10) in nature, describe how these will be addressed in the DCD as COL action items.

b) The information presented in DCD Tier 2, Rev. 16, Section 12.1-12.5, identifies some AP1000 general design features that would minimize the contamination of the facility and environment and would minimize the generation of radioactive waste. However, this information does not address design features that are unique to system designs or their locations in the plant warranting more technical details, and do not identify those that should be addressed as COL action items. For each of the systems listed below (and for any other plant systems which may generate radioactive waste), describe specific design features which are incorporated into the AP1000 design to comply with the requirements of 10 CFR 20.1406.

Nuclear Steam Supply
Fuel Storage and Handling
Condensate Storage and Transfer System
Process Sampling System
Equipment, Floor, Chemical, and Detergent Drain Systems
Building heating, ventilating and air conditioning systems used to process radioactive process and effluent streams
Turbine Main Steam System
Other Features of Steam and Power Conversion System

List these specific design features in the appropriate section of the DCD where the system is described and include a reference to these sections in Chapter 12.1 of the DCD.

1) Describe any design features to detect leakage (large acute or small, long term) from the piping in the radwaste trenches.

2) Describe the criteria which govern the frequency of performing periodic visual inspections of the piping in the radwaste pipe trenches to check for leaks and of the floor/wall expansion joints in the radwaste pipe trenches to ensure that no spills or leaks on the floors enter unmonitored areas beneath the floors and foundations.
3) Verify that there are no piping runs containing contaminated fluids that will be buried in the ground and not routed through one of the radwaste trenches.

RAI SRP-12.2 CHPB-01

In its review of DCD Section 12.2, the staff identified areas in which additional information was necessary to complete its evaluation of the applicant's change. In tier 2 DCD Section 11.2, the staff noted that a potential exists for the quantity of the radionuclides in the radwaste building portion of the liquid waste management system to exceed the A_1 value., The description of the sources listed for liquid waste tanks does not indicate an increase in volume approximately 45,000 gallons and hence increase the overall radioactivity which would thereby be a larger source of occupational radiation to personnel in the radwaste building. The Westinghouse TR-116, Document APP-GW-GLN-116, "*Additional Liquid Radwaste Monitor Tanks and Radwaste Building Extension*," Revision 0, describes the changes to the radwaste building and the addition of the three liquid radwaste monitor tanks. In Tier 2, Figure 12.3-1 (Sheet 14 of 16), Radiation Zones, Normal Operation/Shutdown Radwaste Bldg EL 100'-0" indicates that the room (Rm No. 50355) that the tanks will be located in are Plant Radiation Zone 1, which is defined by Figure 12.3-1 (Sheet 1 of 16) as *Very Low or No radiation Sources: "Inside Controlled Area" and Outside "Restricted Area"*. There are no supporting calculations to show that the tanks when full, will result in a dose rate of less than or equal to 0.25 millirem per hour.

Provide a complete description of the how the placement of three additional liquid waste monitor tanks and associated equipment in the radwaste building meets the acceptance criteria of SRP 12.2.
Describe the effect on occupational exposures in and adjacent to the radwaste building. Include this information in the DCD and provide a markup of the text and appropriate revised radiation zone maps in your response.

RAI SRP-12.2 CHPB-02

In DCD Section 9.1.2.1, Design Basis, the applicant increased the overall capacity of the Spent Fuel Storage from the proposed storage locations for 619 fuel assemblies to storage locations for 884 fuel assemblies. The staff noted that the additional fuel assemblies were not addressed in DCD Section 122.1.2.3, "Spent Fuel," nor included in Table 12.2-25, "Fuel Handling Area Airborne Radioactivity Concentrations." The addition of potentially 265 fuel assemblies with 0.25% fuel defects would increase the airborne radioactivity. Moreover, in Table 12.2-25, the applicant did not identify the basis of its parameters included in Table 12.2-24 for the number of Fuel assemblies or burn-up assumptions used in its calculations.
Provide a complete description of the potential radiological effects associated with the addition of 265 additional fuel assemblies in the spent fuel pool and its associated airborne radioactivity. Include this information in the DCD and provide a markup in your response.