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Your ref: Docket No. 52-006
Our ref: DCP/NRC1673

January 19, 2004

SUBJECT: Transmittal of Revised Responses to AP1000 DSER Open Items

This letter transmits Westinghouse revised responses to Open Items in the AP1000 Design Safety Evaluation Report (DSER). A list of the revised DSER Open Item responses transmitted with this letter is Attachment 1. The non-proprietary responses are transmitted as Attachment 2.

Please contact me at 412-374-4728 if you have any questions concerning this submittal.

Very truly yours,

R. P. Vijuk, Manager
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/Attachments

1. List of the AP1000 Design Certification Review, Draft Safety Evaluation Report Open Item Responses transmitted with letter DCP/NRC1673
2. Non-Proprietary AP1000 Design Certification Review, Draft Safety Evaluation Report Open Item Responses dated January 19, 2004

D063

Attachment 1

List of

Non-Proprietary Responses

Table 1 "List of Westinghouse's Responses to DSER Open Items Transmitted in DCP/NRC1673"	
1.10-1 Revision 1 14.3.4-1 Revision 1	

DCP/NRC1673
Docket No. 52-006

January 19, 2004

Attachment 2

AP1000 Design Certification Review
Draft Safety Evaluation Report Open Item Non-Proprietary Responses

AP1000 DESIGN CERTIFICATION REVIEW

Draft Safety Evaluation Report Open Item Response

DSER Open Item Number: 1.10-1 Response Revision 1

Original RAI Number(s): None

Summary of Issue:

Westinghouse included a summary of COL action items in Design Control Document (DCD) Tier 2 Table 1.8-2, and provided an explanation of the items in the applicable sections of the DCD. The staff identified a number of COL action items that resulted from its review throughout this Report. A cross-reference of the COL action items will be provided in Appendix F of the final safety evaluation report. The staff has not yet completed the cross-reference of the COL action items. This is DSER Open Item 1.10-1.

Westinghouse Response:

Westinghouse has identified the COL action items in the AP1000 DCD. The COL action items are consistent with the COL action items that were required for the AP600. In addition, Westinghouse has identified additional COL action items as appropriate to account for differences in the AP1000 design, differences in the scope of the AP1000 Design Certification, and NRC requests for additional information. The COL action item cross-reference table is included in DCD Section 1.8.

NRC Comments/Handout from 12/17/03 status meeting:

NRC provided a handout at the 12/17/03 status meeting that identified Westinghouse actions resulting from NRC review of AP1000 DCD COL information items.

Westinghouse Response (Revision 1):

Revision 1 of this response provides Westinghouse responses to the handout at the 12/17/03 status meeting that identified Westinghouse actions resulting from NRC review of AP1000 DCD COL information items, as follows:

Item #: 7.2.3-2

Comment Description

DSER addresses two issues. (1) Response time testing, and (2) Setpoint methodology. The Westinghouse wording only mention "Setpoint methodology". The DCD should be modified to include "Response time testing". Then our FSER can use their wording.
The issue being addressed here is Plant-Specific Action Item 12 resulting from the NRC review of the Common Q platform. DCD section 7.1.6 currently requires the COL to provide resolution to all plant-specific action items resulting from NRC review of the I&C platform. If the Common Q platform is used, then the existing wording will require resolution for all plant-specific action items, including item 12.

Westinghouse Response

To clarify that response time testing is included, the words "response time testing" will be added to section 7.1.6, as shown:

Design Control Document (DCD) Revision:

7.1.6 Combined License Information

Combined License applicants referencing the AP1000 certified design will provide a calculation of setpoints for protective functions consistent with the methodology presented in Reference 5. Reference 5 is an AP600 document that describes a methodology that is applicable to AP1000. AP1000 has some slight differences in instrument spans.

Combined License applicants referencing the AP1000 certified design will provide resolution for generic open items and plant-specific action items resulting from NRC review of the I&C platform. This will include definition of a methodology for overall response time testing.

Item #: 7.2.6-1

Comment Description

DSER addresses two issues. (1) Completion Time, and (2) FMEA. The Westinghouse wording only mention FMEA. The DCD should be modified to include "Completion Time". Then our FSER can use their wording.

Westinghouse Response

DCD section 7.2.3 will be revised as shown:

Design Control Document (DCD) Revision:

7.2.3 Combined License Information

Combined License applicants referencing the AP1000 certified design will provide an FMEA for the protection and safety monitoring system. The FMEA will include a Software Hazards Analysis. This FMEA will provide the basis for those Technical Specification Completion Times that rely on an FMEA for their basis.

Item #: 14.4-4

Comment Description

DSER wording is significantly different from the writeup in the DCD, Revision 7.

The FSER should be revised to state:

"The COL applicant ~~and~~or holder is responsible for review and evaluation of individual test results. Test exceptions or results that do not meet acceptance criteria are identified to the affected and responsible design organizations, and corrective actions and retest, as required, will be performed. ~~In as much as test results will not be available until a facility is built, the NRC staff determined that it is appropriate and acceptable to defer the review and evaluation of individual test results to the COL applicant or COL holder, as appropriate.~~ This is a COL Action Item 14.4-4"

The DCD should be revised to state:

"The COL applicant or holder is responsible for review and evaluation of individual test results. Test exceptions or results that do not meet acceptance criteria are identified to the affected and responsible design organizations, and corrective actions and retest, as required, will be performed."

Westinghouse Response

Section 14.4.4 of the DCD will be revised as shown:

Design Control Document (DCD) Revision:

14.4.4 Review and Evaluation of Test Results

The Combined License applicant or holder is responsible for review and evaluation of individual test results. Test exceptions or results which do not meet acceptance criteria are identified to the affected and responsible design organizations, and corrective actions and retests, as required, are performed.

Item #: 14.4-6

Comment Description

The FSER should be revised to state:

"The COL applicant or ~~licensee~~holder for the first plant and the first three plants will perform the tests listed in subsection 14.2.5. For subsequent plants, the COL applicant or licensee shall either perform the tests listed in subsection 14.2.5, or shall provide a justification that the results of the first-plant-only tests or first-three-plant tests are applicable to the subsequent plant. This is COL Action Item14.4-6."

The DCD should be revised to state:

"The COL applicant or holder for the first plant and the first three plants will perform the tests listed in subsection 14.2.5. For subsequent plants, the COL applicant will either perform the tests listed in subsection 14.2.5, or will provide a justification that the results of the first-plant-only tests or the first-three-plant tests are applicable to the subsequent plant."

Westinghouse Response

Section 14.4.6 of the DCD will be revised as shown:

Design Control Document (DCD) Revision:

14.4.6 First-Plant-Only and Three-Plant-Only Tests

[*The COL applicant or holder for the first plant and the first three plants will perform the tests listed in subsection 14.2.5. For subsequent plants, the COL applicant or licensee shall either perform the tests listed in subsection 14.2.5, or shall provide a justification that the results of the first-plant-only tests or first-three-plant tests are applicable to the subsequent plant.*]*

Item #: 17.1-1

Comment Description

DSER wording is significantly different from the writeup in the DCD, Revision 7

The FSER should be revised to state:

The ~~Combined License (~~COL~~)~~ applicant or holder will address its quality assurance (QA) program for the design phase, as well as its QA program for procurement, fabrication, installation, construction and testing of structures, systems, and components (SSCs) in the facility. The quality assurance program will include provisions for seismic Category II structures, systems and components. ~~When completing the detailed design during the COL design phase, the COL applicant is required to submit its design phase QA program for staff review. This will be in addition to the staff review of the COL applicant 's QA program for construction of the facility. This is described as a COL information item in DCD Tier 2 Section 17.5. The NRC staff agrees that this part of the QA program can be the COL applicant's responsibility and that making this a COL item in DCD Tier 2 Section 17.5 is acceptable.~~ This is COL Action Item 17.1-1.

The DCD should be revised to state:

The COL applicant or holder will address its design phase Quality Assurance program, as well as its Quality Assurance Program for procurement, fabrication, installation, construction, and testing of structures, systems and components in the facility. The quality assurance program will include provisions for seismic Category II structures, systems and components.

Westinghouse Response

Section 17.5 of the DCD will be revised as shown:

Design Control Document (DCD) Revision:

17.5 Combined License Information Items

The Combined License applicant or holder will address its design phase Quality Assurance program, as well as its Quality Assurance program for procurement, fabrication, installation, construction and testing of structures, systems and components in the facility. The quality assurance program will include provisions for seismic Category II structures, systems, and components.

The COL applicant or holder will establish PRA importance measures, the expert panel process, and other deterministic methods to determine the site-specific list of SSCs under the scope of RAP.
The Combined License applicant is responsible for integrating the objectives of the O-RAP into the Quality Assurance Program developed to implement 10 CFR 50, Appendix B. This program will address failures of safety-related, risk-significant SSCs that result from design and operational errors in accordance with SECY-95-132, Item F.

The Combined License applicant or holder will address its Quality Assurance program for operations.

Item #: 17.2-1

Comment Description

The FSER should be revised to state:

The COL applicant or holder will address its QA program for operations. This is described as a COL information item in DCD Tier 2 Section 17.5. ~~The NRC staff agrees that this part of the QA program can be the COL applicant's responsibility and that making this a COL item in DCD Tier 2 Section 17.5 is acceptable.~~ This is COL Action Item17.2-1.

The COL applicant or holder will address its QA program for operations.

Westinghouse Response

The requested changes are incorporated under item 17.1-1 above.

Item #: 20.3-1

Comment Description

DCD 1.9.4.2.2 Issue 142 AP1000 Response (Page 1.9-65) has error in their statement. This statement is same as AP600 response to Issue 142. However, the AP1000 DCD Chapter 7 has been revised such that there is no Section 7.1.4.2.7, "Conformance to the Requirements Concerning Control and Protection System Interaction," and "Isolation Devices" is under Section 7.1.2.10, not under "7.1.2.11" as stated in AP1000 response to Issue 142. Westinghouse should revise DCD 1.9.4.2.2 Issue 142 AP1000 Response to correct all the discrepancies between chapter 7 and chapter 1.9 statements. and provide proper justification why "COL Action" is not required. Also, AP1000 should address compliance with IEEE-603 standard, not IEEE-279.

Westinghouse Response

The COL item in DCD Section 13.5 references all generic issues addressed in DCD Section 1.9. A specific COL item for Issue 142 is not required.

DCD Table 1.6-1 and Sections 1.9.4.2.2 and 1.9.6 will be revised as shown to correct the Issue 142 references to Chapter 7:

Design Control Document (DCD) Revision:

Table 1.6-1 (Sheet 3 of 20)

MATERIAL REFERENCED

DCD Section Number	Westinghouse Topical Report Number	Title
1.9	WCAP-15993	Evaluation of the AP1000 Conformance to Inter-System Loss-of-Coolant Accident Acceptance Criteria, December 2002
	WCAP-15799	AP1000 Compliance with SRP Acceptance Criteria, Revision 1, August 2003
	WCAP-15800	Operational Assessment for AP1000
	WCAP-14477	The AP600 Adverse Systems Interactions Evaluation Report, Revision 1, April 1997
	WCAP-15776	Safety Criteria for the AP1000 Instrumentation and Control Systems
1A	WCAP-8577	The Application of Pre-Heat Temperature After Welding of Pressure Vessel Steels, September 1975

1.9.4.2.2 Task Action Plan Items

Issue 142 Leakage Through Electrical Isolators in Instrumentation Circuits

Discussion:

Generic Issue 142 addresses the susceptibility to leakage of isolation devices between safety- and nonsafety-related electrical systems. The NRC requires that licensees identify isolation devices in instrumentation circuits that are potentially susceptible to electrical leakage, define and perform an inspection and test program, replace failed or unacceptable isolators, and implement an annual program to inspect and test all electronic isolators between Class 1E and non-Class 1E systems.

AP1000 Response:

The use of isolation devices in the AP1000 Instrumentation and Control Architecture is described in subsections 7.1.2.10, "Isolation Devices," 7.7.1.11, "Diverse Actuation System," and WCAP-15776 (Reference70), Section 3.9, "Conformance to the Requirements to Maintain Independence Between Safety Systems and Other Interconnected Equipment (Paragraph 5.6.3.1 of IEEE 603-1991)." As stated in WCAP-15776, Section 3.9, the isolation devices are tested to conform to requirements. This testing meets the requirement for an inspection and test program and identifies those devices that are potentially susceptible to electrical leakage. Implementation of an annual program to inspect and test all electronic isolators between Class 1E and non-Class 1E systems is the responsibility of the Combined License holder. The use of fiber-optic data links eliminates electrically conductive paths between receiving and transmitting terminals, and eliminates the potential for electrically generated noise caused by leakage through an isolator. These communication links also use extensive testing and error checking to minimize erroneous transmissions. These data links are described in subsection 7.1.2.8, "Communication Functions." In addition, electromagnetic design, testing, and qualification is performed as described in WCAP-15776, Section 2.6, "Design Basis: Range of Conditions for Safety System Performance (Paragraph 4.7 of IEEE 603-1991.)

1.9.6 References

70. WCAP-15776, "Safety Criteria for the AP1000 Instrumentation and Control Systems," April 2002.

Item #: 20.7-1

Comment Description
This item is included in WCAP-15800, "Operational Assessment for AP1000." WCAP-15800 identifies that it is part of COL Verification/Procedural issue DCD Section 13.5. However, DCD Section 13.5 does not specifically address this issue.

Westinghouse Response

Verification that the reset functions operate as designed is performed during preoperational testing. Note that WCAP 15800 identifies both DCD Section 13.5 and Chapter 14 for this item (Section 13.5 for the procedural aspects and Chapter 14 for the verification aspects). DCD subsection 14.2.9.1.12 describes the preoperational testing of the protection and safety monitoring system that will verify proper operation of all functions, including reset functions. DCD subsection 14.2.9.1.12 will be revised as shown to address the concerns of Bulletin 80-06.

Design Control Document (DCD) Revision:

14.2.9.1.12 Protection and Safety Monitoring System Testing

General Test Methods and Acceptance Criteria

Performance of the protection and safety monitoring system is observed and recorded during a series of individual component and integrated tests designed to verify operation of the system components. The following testing verifies that the system operates as described in Section 7.1 and appropriate design specifications:

a) Processing of the analog and digital signals is verified by injecting reference signals and verifying the outputs at various locations in the system.

b) Capability to process sensor data and main control room manual inputs resulting in the initiation of appropriate reactor trip signals is demonstrated by simulating inputs for each of the trip functions. Response times are verified by demonstrating that the applicable trip, actuate, permissive or interlock signal reaches the actuated equipment within the maximum allowable period following a defined step change in the applicable simulated input, above or below the trip, actuate, permissive or interlock setpoint. Operation of the protection cabinet trip/normal/bypass switches and indicators for each of the reactor trip functions is demonstrated by verifying appropriate outputs. Verification that the reactor trip bypass logic satisfies the single failure criteria is demonstrated by operating the bypass switches while simulating channel failures. Proper operation of the reactor trip reset function will be verified.

c) Operation of the reactor trip breakers, including breaker interlock, alarm, and tripping functions and verification that reactor trip response times are less than the specified maximum allowable response times is performed by initiating a manual reactor trip from the main control room. The capability of the undervoltage coil and the shunt trip coil

functions to independently trip the reactor trip breakers is verified during this test using the test capabilities provided by the reactor trip switchgear interface.

d) The capability to trip the reactor from the remote shutdown workstation is demonstrated by verifying actuation of the reactor trip breaker undervoltage and shunt trip attachments upon initiation of a reactor trip at the remote shutdown workstation location.

e) The capability of the protection and safety monitoring system to process sensor data and manual inputs, resulting in appropriate engineered safety features actuation at design setpoints, is demonstrated by verifying that injection of simulated inputs for each of the engineered safety features actuation functions results in the proper output as indicated by contact operation, component actuation, or electrical test. Response times associated with the engineered safety features actuation functions are evaluated during these tests to provide verification that the applicable trip, actuate, permissive or interlock signal reaches the actuated equipment within the maximum allowable period following a defined step change in the applicable simulated input above or below the trip, actuate, permissive or interlock setpoint. Operation of the manual actuation/bypass switches and indicators for each of the engineered safety features functions is verified by demonstrating appropriate system outputs. Verification that the engineered safety features bypass logic satisfies the single failure criteria is demonstrated by operating the bypass switches while simulating channel failures. Correct input processing and calculational accuracy of the redundant actuation equipment and operator interface features is verified for each defined engineered safety features actuation function using simulated inputs. Proper operation of the engineered safety features reset functions will be verified.

Item #: 20.7-8

Comment Description

GL-88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary in PWR Plant Components," requested assurance that licensees had implemented a program to ensure that boric acid corrosion does not degrade the RCPB. In WCAP-15800, Revision 1, "Operational Assessment for AP1000," the applicant indicated that this GL is not applicable to the AP1000 design and because it is the responsibility of the COL applicant. The staff agrees that this is an inspection issue and within the scope of the COL applicant. However, the DCD Tier 2 material does not provide a COL commitment that the COL applicant will be developing a boric acid corrosion program to provide reasonable assurance of compliance with the applicable regulatory requirements. The DCD needs to be revised, for example in Section 5.2, to indicate this COL commitment. Westinghouse is requested to address this issue.

Westinghouse Response

Section 5.2.6.2 of he DCD will be revised as shown:

Design Control Document (DCD) Revision:

5.2.6.2 Plant-Specific Inspection Program

The Combined License applicant will provide a plant-specific preservice inspection and inservice inspection program. The program will address reference to the edition and addenda of the ASME Code Section XI used for selecting components subject to examination, a description of the components exempt from examination by the applicable code, and drawings or other descriptive information used for the examination.

The preservice inspection program will include examinations of the reactor vessel closure head equivalent to those outlined in subsection 5.3.4.7.

The inservice inspection program will address the susceptibility calculations, inspection categorization, inspections of the reactor vessel closure head, and associated reports and notifications as defined in NRC Order EA-03-009, "Interim Inspection Requirements for Reactor Vessel Heads at PWRs."

The inservice inspection program will also include provisions to ensure that boric acid corrosion does not degrade the reactor coolant pressure boundary.

Item #: 20.7-13

Comment Description

COL Action Item 20.7-13 is related to Generic letter 93-04, Rod Control System Failure and Withdrawal of Rod Cluster Assemblies. GL 93-04 was closed based on NRC approval of WCAP-13864, Rev. 1, which requires licensees to perform additional rod control system surveillance tests at the beginning of each cycle. Westinghouse indicated that this is COL's responsibility.

To respond to COL Action Item 20.7-13, AP1000 DCD should include a statement that COL applicants referencing AP1000 certified design will establish procedures to perform rod control system surveillance tests specified in WCAP-13864, Revision 1, at the beginning of each fuel cycle.

Westinghouse Response

DCD sections 13.5 and 13.7 and Table 1.6-1 will be revised as shown to address the concerns of Generic Letters 93-04 and 96-01.

Design Control Document (DCD) Revision:

13.5 Plant Procedures

Plant procedures are the responsibility of the Combined License applicant. References to applicable combined license information are included in Section 1.8. This includes, for example, reference to guidelines on inservice inspection in Chapters 3 and 6, and initial testing in Chapter 14. Operational experience and the resolution of generic issues to be considered in the preparation of plant procedures are outlined in Section 1.9. The Combined License applicant will establish procedures to perform rod control system surveillance tests specified in WCAP-13864, Rev. 1 (Reference 7), at the beginning of each fuel cycle. The Combined License applicant will ensure that all portions of the safety-related logic circuitry are adequately covered in the surveillance procedures as described in Generic Letter 96-01 (Reference 8).

Table 1.6-1 (Sheet 12 of 20)

MATERIAL REFERENCED

DCD Section Number	Westinghouse Topical Report Number	Title
13.7	WCAP-14690	Designer's Input to Procedure Development for the AP600, Revision 1, June 1997

Table 1.6-1 (Sheet 12 of 20)		
MATERIAL REFERENCED		
	WCAP-13864	Rod Control System Evaluation Program, Revision 1-A, November 1994

13.7 References

7. WCAP 13864, "Rod Control System Evaluation Program," Revision 1-A, November 1994.

8. USNRC Generic Letter GL-96-01, "Testing of Safety-Related Logic Circuits," dated January 10, 1996.

Item #: 20.7-14

Comment Description

This item is included in WCAP-15800, "Operational Assessment for AP1000." WCAP-15800 identifies that it is part of DCD Section 7.1.2. However, DCD Section 7.1.2 does not specifically address this issue. Westinghouse's August 21, 2003 letter identifies that this issue is under DCD Section 13.5. However, DCD Section 13.5 does not specifically address this issue.

Westinghouse Response

This item is addressed as part of Item 20.7-13 above.

Item #: 20.7-15

Comment Description
DCD Section 9.1.6 should be revised to state the following:

"The Combined License applicant is responsible for a confirmatory criticality analysis for the new fuel rack, as described in subsection 9.1.1.3. **This analysis should address the degradation of Boraflex in the spent fuel pool storage racks as identified in GL-96-04, and assess the Boraflex capability to maintain a 5% subcriticality margin.**

The Combined License applicant is responsible for a confirmatory criticality analysis for the spent fuel racks, as described in subsection 9.1.2.3. **This analysis should address the degradation of Boraflex in the spent fuel pool storage racks as identified in GL-96-04, and assess the Boraflex capability to maintain a 5% subcriticality margin."**

Westinghouse Response
As in other parts of the AP1000 DCD, it is preferable to use the more generic term "integral neutron absorbing material" rather than the brand name "Boraflex". Therefore, section 9.1.6 of the DCD will be revised as shown:

Design Control Document (DCD) Revision:

9.1.6 Combined License Information for Fuel Storage and Handling

The Combined License applicant is responsible for a confirmatory structural dynamic and stress analysis for the new fuel rack, as described in subsection 9.1.1.2.1.

The Combined License applicant is responsible for a confirmatory criticality analysis for the new fuel rack, as described in subsection 9.1.1.3. This analysis should address the degradation of integral neutron absorbing material in the new fuel pool storage racks as identified in GL-96-04, and assess the integral neutron absorbing material capability to maintain a 5% subcriticality margin.

The Combined License applicant is responsible for a confirmatory structural dynamic and stress analysis for the spent fuel racks, as described in subsection 9.1.2.2.1. This includes reconciliation of loads imposed by the spent fuel racks on the spent fuel pool structure described in subsection 3.8.4.

The Combined License applicant is responsible for a confirmatory criticality analysis for the spent fuel racks, as described in subsection 9.1.2.3. This analysis should address the degradation of integral neutron absorbing material in the spent fuel pool storage racks as identified in GL-96-04, and assess the integral neutron absorbing material capability to maintain a 5% subcriticality margin."

Item #: 20.7-16

Comment Description

GL-97-06, "Degradation of Steam Generator Internals," requested, in part, that licensees discuss any programs in place to detect degradation of steam generator internals including a description of the plans, scope, frequency, methods, and equipment used. In WCAP-15800, Revision 1, "Operational Assessment for AP1000," the applicant indicated that this GL is not applicable to the AP1000 design since it is a procedural issue and the tube supports are fabricated from stainless steel.

The staff agrees that this is a procedural issue that will have to be addressed by the COL applicant and that the likelihood of degradation of the SG internals will be less given the AP1000 SG design; however, the design does not eliminate the potential for degradation of the steam generator internals to occur. As a result, the staff concludes that the COL applicant will need to develop a program for periodic monitoring for potential degradation of steam generator internals and that the DCD needs to be revised, for example in Section 5.4, to indicate this COL commitment. Westinghouse is requested to address this issue.

Westinghouse Response

As of DCD Revision 8, the DCD states:

5.4.15 Combined License Information

The Combined License applicant will address steam generator tube integrity with a Steam Generator Tube Surveillance Program and will address the need to develop a program for periodic monitoring of degradation of steam generator internals.

(The underlined portion was added as part of Revision 8.) Thus, this concern has already been addressed.

Design Control Document (DCD) Revision:

None.

AP1000 DESIGN CERTIFICATION REVIEW

Draft Safety Evaluation Report Open Item Response

DSER Open Item Number: 14.3.4-1 (Response Revision 1)

Original RAI Number(s): None

Summary of Issue:

Control room χ/Q values are not provided in Table 5.0-1, "Site Parameters." In the staff's judgment these values should also be provided in the table as were the Exclusion Area Boundary and Low Population Zone χ/Q values. However, even when provided in Table 5.0-1, the control room χ/Q values remain an open item for the following reason. As part of its review of Table 15A-5, "Atmospheric Dispersion Factors (χ/Q) for Accident Analysis," in Tier 2, the staff initially asked the applicant if the methodology and all inputs and assumptions related to the control room χ/Q values would be evaluated as part of the COL review. The applicant provided a detailed response stating that the methodology, inputs and assumptions would be provided as part of the COL and noting additional information about the analysis. NRC staff issued a second RAI to inquire if the applicant was seeking certification of any of the AP1000 design values used as inputs to the χ/Q calculations. The applicant subsequently provided certain design-specific information that was used as input to the assessment and for which the applicant was seeking certification. The staff has not completed its evaluation of this response, but has identified unresolved issues related to adequate justification for assuming a diffuse release, estimation of initial sigma values, other release assumptions, building cross-sectional areas, and distances between release/receptor pairs. Pending completion of the review, this is open item 14.3.4-1.

Westinghouse Response:

The information that is documented in Tier 1 (which includes Table 5.0-1) was the subject of extensive discussion between NRC and representatives of the nuclear power industry. A graded approach was applied to determine the information that must be included in Tier 1 documentation, and the information to be included in Tier 2. The outcome of that process with respect to Tier 1 / Tier 2 split is reflected in the current AP1000 DCD.

The remainder of this open item is the same as DSER open item 2.3.4-1, and will be addressed under that open item.

NRC Comment at 12/17/03 status meeting:

The MCR χ/Q values should be included in the site parameters table in AP1000 DCD Chapter 2 and in AP1000 DCD Tier 1 Table 5.0-1.

Westinghouse Response (Revision 1):

The AP1000 DCD Revision 8 includes the re-calculated MCR χ/Q values in the Chapter 2 site parameters table. AP1000 DCD Tier I Section 5.0 will be revised as shown below.

Design Control Document (DCD) Revision:

5.0 Site Parameters

Table 5.0-1 identifies the key site parameters that are specified for the design of safety-related aspects of structures, systems, and components for the AP1000. An actual site is acceptable if its site characteristics fall within the AP1000 plant site design parameters in Table 5.0-1.

Table 5.0-1 Site Parameters	
Maximum Ground Water Level	Plant elevation 98 ft
Maximum Flood Level	Plant elevation 100 ft (design grade elevation)
Precipitation	
Rain	19.4 in./hr (6.3 in./5 min)
Snow/Ice	Ground snow load of 75 lb/ft^2 with exposure factor of 1.0 and importance factor of 1.2
Air Temperature	Limits based on historical data excluding peaks of less than 2 hours duration Maximum temperature of 115° dry bulb/80°F coincident wet bulb Maximum wet bulb 81°F (noncoincident) Minimum temperature of -40°F
Tornado	
Wind Speed	Maximum wind speed of 300 mph
Maximum Pressure Differential	Maximum pressure differential of 2.0 lb/in^2
Tornado Missile Spectra	4000-lb automobile at 105 mph horizontal, 74 mph vertical 275-lb, 8-in. shell at 105 mph horizontal, 74 mph vertical 1-in.-diameter steel ball at 105 mph horizontal and vertical

Table 5.0-1 (cont.) Site Parameters		
Soil		
Average Allowable Static Soil Bearing Capacity	Greater than or equal to 8,600 lb/ft^2 over the footprint of the nuclear island at its excavation depth	
Maximum Allowable Dynamic Bearing Capacity for Normal Plus Safe Shutdown Earthquake (SSE)	Greater than or equal to 120,000 lb/ft^2 at the edge of the nuclear island at its excavation depth	
Shear Wave Velocity	Greater than or equal to 8000 ft/sec based on low-strain, best-estimate soil properties over the footprint of the nuclear island at its excavation depth	
Liquefaction Potential	None	
Seismic		
SSE	SSE free field peak ground acceleration of 0.30 g at foundation level of nuclear island with modified Regulatory Guide 1.60 response spectra (See Figures 5.0-1 and 5.0-2.)	
Fault Displacement Potential	None	
Atmospheric Dispersion Factors (X/Q)		
Site Boundary	0- to 2-hour time interval	$\leq 0.6 \times 10^{-3}$ sec/m^3
Low Population Zone Boundary	Annual average	$\leq 2.0 \times 10^{-5}$ sec/m^3
	0 to 8 hours	$\leq 1.35 \times 10^{-4}$ sec/m^3
	8 to 24 hours	$\leq 1.0 \times 10^{-4}$ sec/m^3
	24 to 96 hours	$\leq 5.4 \times 10^{-5}$ sec/m^3
	96 to 720 hours	$\leq 2.2 \times 10^{-5}$ sec/m^3

Table 5.0-1 (cont.) Site Parameters					
Control Room Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis					
χ/Q (s/m^3) at HVAC Intake for the Identified Release Points[1]					
	Plant Vent or PCS Air Diffuser[3]	**Ground Level Containment Release Points[4]**	**PORV and Safety Valve Releases[5]**	**Steam Line Break Releases**	**Fuel Handling Area[6]**
0 - 2 hours	2.5E-3	2.5E-3	2.0E-2	2.4E-2	6.0E-3
2 - 8 hours	1.7E-3	1.7E-3	1.8E-2	2.0E-2	4.0E-3
8 - 24 hours	1.0E-3	1.0E-3	7.0E-3	7.5E-3	2.0E-3
1 - 4 days	8.0E-4	8.0E-4	5.0E-3	5.5E-3	1.5E-3
4 - 30 days	7.0E-4	8.0E-4	4.5E-3	5.0E-3	1.0E-3
χ/Q (s/m^3) at Control Room Door for the Identified Release Points[2]					
	Plant Vent or PCS Air Diffuser[3]	**Ground Level Containment Release Points[4]**	**PORV and Safety Valve Releases[5]**	**Steam Line Break Releases**	**Fuel Handling Area[6]**
0 - 2 hours	1.0E-3	1.5E-3	4.0E-3	4.0E-3	6.0E-3
2 - 8 hours	8.0E-4	8.0E-4	3.2E-3	3.2E-3	4.0E-3
8 - 24 hours	4.0E-4	4.0E-4	1.2E-3	1.2E-3	2.0E-3
1 - 4 days	3.0E-4	4.0E-4	1.0E-3	1.0E-3	1.5E-3
4 - 30 days	2.5E-4	4.0E-4	8.0E-4	8.0E-4	1.0E-3

Notes:

1. These dispersion factors are to be used 1) for the time period preceding the isolation of the main control room and actuation of the emergency habitability system, 2) for the time after 72 hours when the compressed air supply in the emergency habitability system would be exhausted and outside air would be drawn into the main control room, and 3) for the determination of control room doses when the non-safety ventilation system is assumed to remain operable such that the emergency habitability system is not actuated.
2. These dispersion factors are to be used when the emergency habitability system is in operation and the only path for outside air to enter the main control room is that due to ingress/egress.
3. These dispersion factors are used for analysis of the doses due to a postulated small line break outside of containment. The plant vent and PCS air diffuser are potential release paths for other postulated events (loss-of-coolant accident, rod ejection accident, and fuel handling accident inside the containment); however,

the values are bounded by the dispersion factors for ground level releases.

4. The listed values represent modeling the containment shell as a diffuse area source, and are used for evaluating the doses in the main control room for a loss-of-coolant accident, for the containment leakage of activity following a rod ejection accident, and for a fuel handling accident occurring inside the containment.

5. The listed values bound the dispersion factors for releases from the steam line safety & power-operated relief valves and the condenser air removal stack. These dispersion factors would be used for evaluating the doses in the main control room for a steam generator tube rupture, a main steam line break, a locked reactor coolant pump rotor, and for the secondary side release from a rod ejection accident. Additionally, these dispersion coefficients are conservative for the small line break outside containment.

6. The listed values bound the dispersion factors for releases from the fuel storage and handling area. The listed values also bound the dispersion factors for releases from the fuel storage area in the event that spent fuel boiling occurs and the fuel building relief panel opens on high temperature. These dispersion factors are used for the fuel handling accident occurring outside containment and for evaluating the impact of releases associated with spent fuel pool boiling.

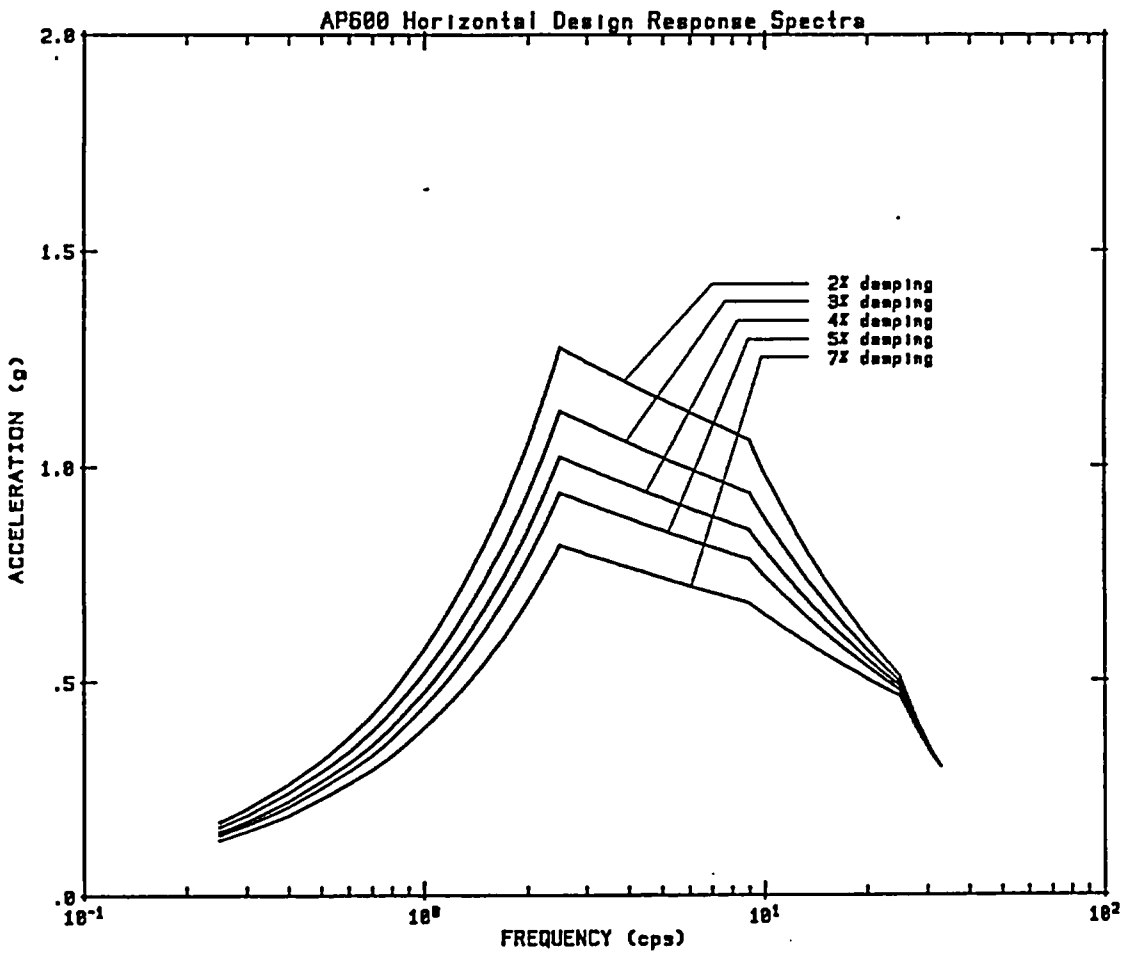

Figure 5.0-1
Horizontal Design Response Spectra
Safe Shutdown Earthquake

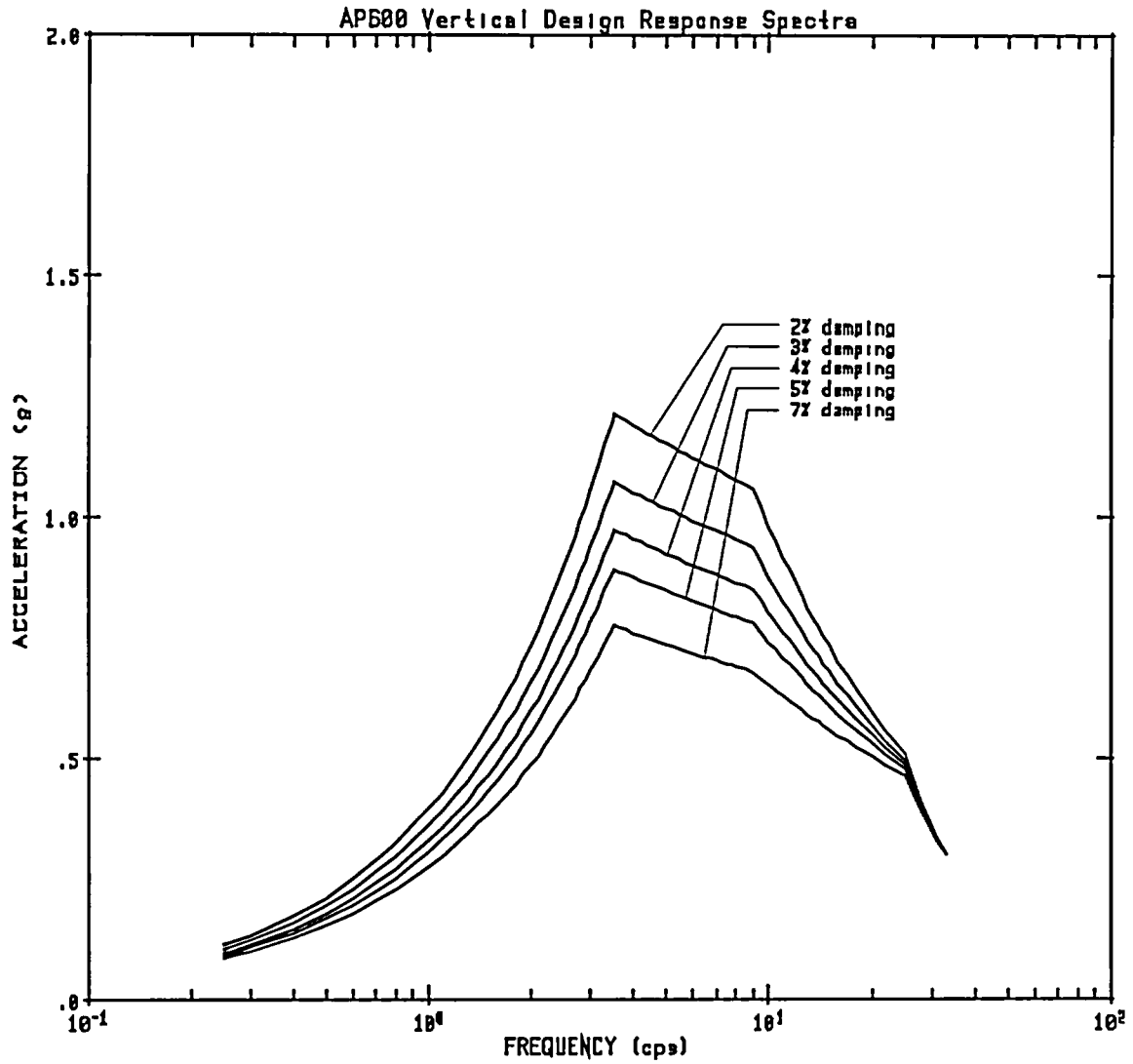

Figure 5.0-2
Vertical Design Response Spectra
Safe Shutdown Earthquake

PRA Revision:

None