March 22, 2004

MEMORANDUM TO: Laura A. Dudes, Section Chief
New Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs, NRR

FROM: Joseph Sebrosky, Senior Project Manager ***/RA/***
New Reactors Section
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Division of Regulatory Improvement Programs, NRR

SUBJECT: SUMMARY OF DISCUSSIONS REGARDING CONSTRUCTION INSPECTION TEAM REVIEW OF THE AP1000 INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA (ITAAC)

As discussed in a September 16, 2003, meeting with Westinghouse and documented in a meeting summary dated October 8, 2003 (ADAMS Accession Number ML032720614), the construction team reviewed the AP600 ITAAC as part of its effort to develop NRC inspection procedures to verify the ITAAC. During the meeting the staff provided a list of questions related to its review of the AP600 ITAAC that may have applicability to the AP1000 ITAAC. The staff later determined that these questions did have applicability to the AP1000. In a telephone call on October 15, 2003, Michael Corletti of Westinghouse and I discussed the issue. During this telephone call Westinghouse agreed to review the issues and revise the AP1000 design control document (DCD) accordingly. Revision 8 to the AP1000 DCD, dated December 10, 2003, revised the DCD, as appropriate, to resolve most of the construction team-identified issues. Revision 7 to the AP1000 DCD resolved one of the construction team-identified issues and Revision 9 to the AP1000 DCD resolved the last issue. The attachment to this memorandum describes the issues and the respective resolution of the issues for the AP1000.

Docket No. 52-006

Attachment: As stated

cc w/atts: See next page

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Disposition of Construction Inspection Team Identified Issues for the AP1000

During the evaluation of inspection resources that would be required to verify the inspections, tests, analyses, and acceptance criteria (ITAAC), a number of inconsistencies were noted with the AP600 Design Control Document (DCD). A subsequent review of the AP1000 DCD was conducted to determine if similar inconsistencies existed. The following contains the list of seven issues that was presented to Westinghouse at a September 16, 2003, meeting based on a review of the AP600 ITAAC. The specific issue for the AP1000 is then discussed followed by the resolution for the AP1000.

AP600 Issue 1

AP-600 Tier 1 Figure 2.3.2-1, Chemical and Volume Control System (CVS), shows four penetrations, the lower three are listed in Table 2.3.2-1 as American Society of Mechanical Engineers (ASME) but the top penetration is not listed. That penetration is also not listed in Tier 1, Table 2.2.1-1. This penetration is for spent resin flush and has a locked close manual valve on the inside and outside (CVS-PL-V040 and CVS-PL-V041) with a relief valve inboard of the outside isolation valve. Shouldn't the penetration be listed in one of the above tables? (The same conditions exist in the AP-1000 Tier 1 text and figure.)

AP1000 Issue 1

Why is the CVS demineralizer resin flush to the solid radwaste system line that is shown in DCD Tier 1, Figure 2.3.2-1 not listed in DCD Tier 1, Table 2.3.2-2? Why are valves CVS-PL-V040 and CVS-PL-V041 that are shown in DCD Tier 1, Figure 2.3.2-1 not listed in Table 2.3.2-1 as ASME Code Section III valves?

AP1000 Resolution

In Revision 8 to the AP1000 DCD dated December 10, 2003, Westinghouse revised DCD Tier 1, Table 2.3.2-2 to include the CVS resin flush containment penetration line. In addition DCD Tier 1, Table 2.3.2-1 was revised to include CVS-PL-V040 and CVS-PL-V041. Therefore, the staff considers this issue resolved for the AP1000.

AP600 Issue 2

The CVS system description in Tier 2, Section 9.3.6.3 states "The [CVS] purification subsystem inside containment is defined as reactor coolant pressure boundary. This subsystem is nonsafety-related and is constructed using … ASME Code Section III." However, the Inside Reactor Containment (IRC) portions shown on Tier 1, Figure 2.3.2-1 are designated "N". The Tier 2 P&ID (Figure 9.3.6-1) appears to show these inside lines as ??D (first 2 digits are difficult to read) where the third digit indicates that this is ANSI B31.1 piping. (Note: The first letter in such a designation indicates the pressure rating, the second digit indicates the material and the third digit indicates the design code. Tier 2 Figure 1.7-2 of the AP1000 DCD contains an

explanation of the designations.) The AP1000 Tier 1 and Tier 2 text and figures were found to have the same Code designations as the AP600. The lines are designated BBD on the AP1000 Tier 2 Figure.

Note: The staff has reviewed the applicability of this question to the AP1000 and notes that portions of the CVS IRC are ASME class 1, 2, and 3, with a major portion of the system designated as "N" or non-ASME Code Section III. Based on the issue described above the staff has identified the following DSER open item for the AP1000.

AP1000 Issue 2

Tier 2, Section 9.3.6.3 of the AP1000 DCD states that the CVS purification subsystem inside the containment is defined as RCS pressure boundary but is non-safety-related that is designed to ASME Section III (The next sentence does state See Section 5.2 for additional information.) Tier 2, Section 9.3.6.1.1 of the DCD further states "[a]s outlined in Section 5.2, a portion of the CVS inside containment that is defined as RCS pressure boundary is non-safety-related and uses an alternate classification." However, DCD Tier 2, Section 5.2.1.1, "Compliance with 10CFR50.55a," which contains the details of the RCS pressure boundary piping, states that the CVS portions have required isolation [valves] and are not classified as RCS pressure boundary. These statements seem to present inconsistent discussions on RCS pressure boundary and Code classifications for the CVS. Please explain these inconsistencies, or modify the DCD accordingly.

AP1000 Resolution

In DCD revision 8 Westinghouse revised Tier 2 sections 5.2.1.1, 9.3.6.1.1, and 9.3.6.3 to clarify the RCS pressure boundary Code classifications for the CVS. Therefore, the staff considers this issue resolved for the AP1000.

AP600 Issue 3

Also on Tier 1, Figure 2.3.2-1, the line connected to V084 (Aux. Spray) is designated "N" but it is connected to a line that is designated "3". P&ID 9.3.6-1 shows the line breaks as BBC indicating the lines are ASME Section III, Class C. I verified the BBC Code breaks on the AP1000 P&ID but noted the same problem with Tier 1, Figure 2.3.2-1.)

AP1000 Issue 3

The ASME code class break classification that appears next to valve CVS-PL-V084 on DCD Tier 1, Figure 2.3.2-1 indicates that the line upstream of this valve is non-ASME code class. However, this line connects through a "T" to an ASME code section III class 3 line. In addition, DCD, Tier 2, Figure 9.3.6-1, shows this same portion of the line immediately upstream of CVS-PL-V084 as an ASME code section III class 3 line. Please explain this inconsistency or modify DCD Tier 1, Figure 2.3.2-1 to correct the problem.

AP1000 Resolution

In DCD revision 8 Westinghouse revised DCD Tier 1, Figure 2.3.2.-1. The ASME code class break classification that appear next to valve CVS-PL-V084 was revised to indicate that the line upstream of this valve is an ASME code section III class 3 line. Therefore, the staff considers this issue resolved for the AP1000.

AP600 Issue 4

Tier 1, Figure 2.3.7-1, spent fuel pool (SFP) Cooling, specifies that a number of pipe segments are classified ASME Section III but there is no listing of ASME components in Table 2.3.7-1. Most of the other sections list the system valves that provide the Code break change. (The drawing in the Tier 2 document does not include line numbers or Code break flags.) Shouldn't the valves be included in the Table?

Based on this question that was provided to the Westinghouse the staff reviewed the AP1000 DCD and noted that there is a listing of some components in Table 2.3.7-1, specifically check valves SFS-PL-V071, and SFS-PL-V072, however other valves that appear to be ASME code class are not listed in this table such as SFS-PL-V045, SFS-PL-V066, SFS-PL-V042, SFS-PL-V040, and SFS-PL-V031.

The staff also noted that there appears to be a typographical error in the AP1000 Tier 1, Section 2.3.7 Design Description Item 2.a). The Item lists Table 2.3.6-1 instead of Table 2.3.7-1.

AP1000 Issue 4

Why are the following valves that are shown in DCD Tier 1, Figure 2.3.7-1, not listed in Table 2.3.7-1 as ASME Code Section III valves: SFS-PL-V045, SFS-PL-V066, SFS-PL-V042, SFS-PL-V040, and SFS-PL-V031.

Why does DCD Tier 1, Section 2.3.7 Design Description 2.a reference Table 2.3.6-1 instead of Table 2.3.7-1?

AP1000 Resolution

In DCD revision 8 Westinghouse included valves SFS-PL-V045, SFS-PL-V066, SFS-PL-V042, SFS-PL-V040, and SFS-PL-V031 in DCD Tier 1, Table 2.3.7-1. In addition, DCD Tier 1, Section 2.3.7 Design Description 2.a was revised to reference Table 2.3.7-1. Therefore, the staff considers this issue resolved for the AP1000.

AP600 Issue 5

Tier 1 Table 2.3.7-1 lists Line L030 as the Reactor Cavity Drain line but it appears that the line should be labeled Refueling Cavity Drain Line. The same condition exists in the AP-1000 Tier 1 DCD which has two lines (L030 & L040) listed Reactor Cavity Drain lines. The piping shown on the P&ID for both plants are connected to the refueling cavity. A new Section 9.1.3.3.8 was added to the AP-1000 SFS System Description that discusses a line from

the Reactor Cavity to the Steam Generator Compartment but this is apparently a different line not shown on the P&ID. A new line with a LO manual valve and two check valves as discussed in 9.1.3.3.8 is shown on AP-1000 Figure 9.1-6 connected to the refueling cavity but its opposite end appears to be blank flanged. (The Reactor Cavity Volume for these designs is somewhat different than earlier designs and is shown on Figures 19.39-5 &6.)

AP1000 Issue 5

Reactor Cavity Drain Lines L030 and L040 are listed in DCD Tier 1, Table 2.3.7-2. However, DCD Tier 1, Figure 2.3.7-1 does not display a "Reactor Cavity" component, instead it displays a "Refueling Cavity" Component. Should the L030, and L040 drain lines listed in DCD Tier 1, Table 2.3.7-2 be labeled as "Refueling Cavity Drain" lines?

AP1000 Resolution

Westinghouse revised Table 2.3.7-2 to clarify the status of these lines. Therefore, the staff considers this issue resolved for the AP1000.

AP600 Issue 6

When reviewing Table 17.4-1 for Significant Risk SSCs, I noted that Nuclear Fuel was included under the heading for Onsite Power. This is the last entry in the Table, should it have a different heading? (The AP1000 Table is the same.)

AP1000 Resolution

In Revision 7 to the AP1000 DCD Westinghouse revised table 17.4-1and moved the Fuel Assembly item from the Onsite Power System heading to the Reactor Coolant System heading. Therefore, the staff considers this issue resolved for the AP1000.

AP600 Issue 7

Chapter 19 includes sections for many of the Risk Significant Systems (but not all) and includes sections for the Non-Class 1E dc and UPS System (19.23) and the Compressed and Instrument Air System (19.25). These two systems are not, however, included in Table 17.4-1 that lists the Risk Significant SSCs. There are no details in the Chapter 19 Sections for any of these systems only a reference to see the system description section. The system description sections, however, do not discuss the probabilistic risk assessment (PRA) determinations. Also there is no listing in the PRA Based Insights Table 19.59-29. Should the Non-Class 1E dc and UPS System and the Compressed and Instrument Air System be included as Risk Significant; if not, why are sections designated for them in Chapter 19?

The Non-class 1E dc system is discussed in AP-1000 Table 19-58-18, AP-1000 PRA Based Insights and the Compressed and Instrument Air System is listed in AP-1000 Table 17.4-1, Risk Significant SSCs.

Note: Subsequent to providing this issue to Westinghouse the staff reviewed the AP1000 DCD and determined that the CAS is listed in DCD Tier 2 Table 17.4-1, however there is only one

reference to the EDS to the EDS distribution panels under the diverse actuation system (DAS) in DCD Tier 2 Table 17.4-1. Based on this the staff has modified the above issue to the DSER open item that appears below.

AP1000 Issue 7

The Non-Class IE DC and UPS System (EDS) is was identified in DCD Tier 2, Section 16.3 as a system needing investment protection controls (See DCD Tier 2, Table 16.3-2, Section 3.4). DCD Tier 2, Section 16.3.1 states that the investment protection systems, structures, and components are included in the design reliability assurance program. Why is the EDS (other than a mention of EDS distribution panels for the DAS power) not listed as Risk Significant in DCD Tier 2, Table 17.4-1?

AP1000 Resolution

In an e-mail from Ron Vijuk of Westinghouse dated December 5, 2003, Westinghouse provided the following rationale for why changes to the AP1000 DCD were not necessary to resolve this issue.

Westinghouse Rationale:

The EDS is included in Table 17.4-1 because it was identified in the PRA as a marginally risk-significant system (see AP1000 PRA Tables 50-12 and 50-13). The primary risk-significant function of EDS is the power supply to DAS. DAS is an energize-to-actuate, 2-out-of-2 system, i.e., no redundancy. DAS requires both power supplies to perform its function. The EDS panels that supply power to the DAS are included in Table 17.4-1. Each of these EDS panels can receive power either from a battery through an inverter or from a regulating transformer. Therefore, the power supplies to these EDS panels listed in Table 17.4-1 have both redundancy and diversity and thus become less important than the panels. As a consequence, UPS distribution panels EDS1-EA-14 and EDS2-EA-14 are included in Table 17.4-1, but the power supplies to these panels are not included.

Other systems listed in Table 17.4-1 that require power from EDS are PLS and the hydrogen igniters. The power supply to these systems is less significant than the power supply to DAS because of the redundancy built into the PLS and the hydrogen igniters. The interconnection between these systems is such that if one of the EDS subsystems were lost, then the PLS components and hydrogen igniters which continue to receive power from the other EDS subsystems will perform the required functions. With this level of redundancy, the power supplies for PLS and the hydrogen igniters is not risk-significant.

Subsequent Discussions

In a subsequent phone call between Ron Vijuk of Westinghouse and Joe Colaccino and Frank Talbot of the NRC, the NRC staff stated that the power supplies to EDS1-EA-14 and EDS2-EA-14 should also be included in Table 17.4-1 based on the risk achievement worth of these components.

Resolution

In Revision 9 to the AP1000 DCD Westinghouse revised table 17.4-1 to include the power supplies to EDS1-EA-14, and EDS2-EA-14. Specifically, Westinghouse added EDS1-EA-1, and EDS2-EA-1 to this table. Therefore, the staff considers this issue resolved for the AP1000.

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