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U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

TO: T. T. MARTIN

SUBJECT: ACTION ITEMS FROM NOVEMBER 13, 1996 ITAAC MEETING

Dear Mr. Martin:

The NRC staff met with Westinghouse in our Rockville offices on November 13, 1996 to discuss the AP600 ITAAC which were submitted on November 7. We received three action items at that meeting, which were summarized in a letter from Mr. Joseph Sebrosky dated December 17, 1996. The enclosure contains our responses to these action items Westinghouse considers these action items as closed.

C Z Haag for CHH

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

/jml

enclosure

cc: T. R. Quay - NRC
J. Sebrosky - NRC

E004

Action Items from 11/13 Meeting on ITAAC

I) Westinghouse will provide an explanation on how the ITAAC and the ITP relate to each other.

This explanation is provided in SSAR Section 14.3, which was submitted on August 9.

II) Westinghouse will provide an explanation on how the safety related connections are addressed in the ITAAC.

The safety-related connections for post 72 hour actions are within the scope of Design Certification, and are included in the various system ITAAC. The general approach is to show the connections on the figures, and to include a commitment that the system functional arrangement is as shown on the figure. In section 1.1 the term functional arrangement is defined as "the major components, interconnections between components and connections to other systems that collectively provide the service for which the system is intended." Thus, the inspection of the system's functional arrangement will verify the existence of the post 72 hour connection shown on the figure. Following is a list of the specific connections shown in various figures within the ITAAC.

Figure #	Title	Connection
2.3.6-1	Normal Residual Heat Removal System	Water makeup to containment
2.2.2-1	Passive Containment Cooling System	Water makeup to Passive Containment Cooling Water Storage Tank
2.3.7-1	Spent Fuel Pool Cooling System	Water makeup to Spent Fuel Pool
2.6.3-1	Class 1E dc and Uninterruptible Power Supply System	Portable generator
2.2.5-1	Main Control Room Emergency Habitability System	Compressed air makeup to storage tanks

III) Westinghouse will provide a response to the comments provided in the June 27, 1996, July 31, 1996, and August 8, 1996 letters. The response will detail how comments were incorporated into the November 7, 1996 submittal, and the reason for not incorporating some of the comments.

Following are responses to these three letters.

Preliminary Comment on the AP600 Pilot ITAAC, (June 27 Letter)

1. *The format of the material that will support the ITAAC is not clear. For example the Standard Safety Analysis Report (SAR) needs to be formatted as Tier 2 information, and Section 14.3 of the Design Control Document (DCD) needs to be submitted. It is not possible to finalize the review of ITAAC without a current revision to the Tier 2 material, since the Tier 1 material is supposed to be consistent with Tier 2. In addition, Section 14.3 of the DCD provides the methodology and criteria for the development of the Tier 1 material. The staff gave guidance on design control document preparation in a June 9, 1995 letter to Westinghouse.*

SSAR section 14.3 was submitted on August 9.

2. *The supporting material for the ITAAC needs to be placed in Tier 2. An example of such supporting material is the descriptions of the methodologies and analyses to demonstrate reconciliation for the ASME Code, Section III stress reports with as built conditions.*

This information is in Tier 2. With respect to the example given above, SSAR section 3.9.8.2 states that the combined license applicant will have available for NRC audit the ASME design specifications and design reports prepared for ASME Section III components.

3. *For the evolutionary designs the Tier 1 introduction contained a "Definitions" section and a "General Provisions" section. If Westinghouse intends to deviate from the material contained in these sections Westinghouse should identify the occurrences and the reason for the deviation.*

The AP600 Tier 1 material contains both a definitions and a general provisions section, both quite similar to the evolutionary plant submittals.

4. *If Westinghouse has changed or will be changing any standard ITAAC wording that was used in the evolutionary designs then Westinghouse should identify those occurrences and the reason for the change. An example of where there appears to be a deviation is the use of the term "functional arrangement" instead of 'basic configuration".*

We recognize the value of using the precedents established by the evolutionary plants where possible, but we do not agree that the AP600 submittal must use identical wording or justify why not. As an example, we have intentionally avoided the "basic configuration" ITAAC which were included in the evolutionary plant submittals. These ITAAC addressed a number of generically applicable system requirements related to weld quality, seismic and environmental qualification, and MOV type testing. This approach is not mandated anywhere, but was voluntarily chosen by the evolutionary plant vendors. On AP600 we have chosen to provide these commitments individually within each applicable system ITAAC. This approach provides the same commitments as the "basic configuration" ITAAC, but is more precise and has less potential for misinterpretation. We define the functional arrangement of a system as "the major components, interconnections between components and connections to other systems that collectively provide the service for which the system is intended." This term is not synonymous with "basic configuration" as used in the evolutionary plant submittals.

5. *Westinghouse must provide ITAAC that address all structures and systems within the scope of the AP600 design, as required by 10 CFR 52.97. The level of detail for the Tier 1 information and ITAAC should be proportional to its safety significance.*

Westinghouse is currently revising the AP600 Tier 1 submittal, based on feedback received from the staff over the past few months. The revised submittal will have ITAAC for essentially the same systems as those in the System 80+ submittal. We note, however, that the System 80+ submittal does not seem to have ITAAC for every system within the scope of its Certified Design. For example, we have identified the following steam and power conversion systems that (a) must be present in some form in the System 80+ design, (b) do not appear to be excluded from the scope of the Certified Design, based on review of the System 80+ SSAR, and (c) are not included in the System 80+ Tier 1 submittal.

- Auxiliary Boiler or Steam Supply System
- Condenser Tube Cleaning System
- Secondary Side Chemical Feed System
- Generator Hydrogen Cooling System
- Feedwater Heater Drain System
- Turbine and Generator Lube Oil System

10 CFR 52.97 states that the Commission must identify those ITAAC which are necessary and sufficient to ensure that the facility has been constructed in conformance with its license. It is not clear that this requires ITAAC on all structures and systems within the scope of the Certified Design. The above examples seem to support a less restrictive interpretation.

6. *The pilot ITAAC for the Normal Residual Heat Removal system included tables listing Major Seismic Category I Equipment, Class 1E Equipment, Main Control Room Displays, Alarms and Controls, Active Safety-Related valves, and Valves subject to interlocks. These tables are useful since they identify the equipment for verification and should be included in other ITAAC as appropriate.*

Tables similar to those mentioned have been included in most of the ITAAC as appropriate. We are glad that the staff finds them to be an improvement over the evolutionary plant submittals.

7. *The ITAAC must be consistent with the pre-operational tests in Tier 2 Section 14.2. The development of the ITAAC and Section 14.2 therefore, can not be independent events.*

We fully agree with this comment, and have taken pains to ensure that section 14.2 and the ITAAC are consistent.

Comments on AP600 Pilot ITAAC - Normal RHR System (July 31 Letter)

Review Against Draft SRP

The information in the ITAAC Design Description for each system should be provided in accordance with Standard Review Plan Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria - Design Certification".

SRP 14.3 is a draft document that was only recently issued for comment. It may provide useful general guidance, but as a draft document it should not be taken as the definitive review standard.

1. System purpose and functions

a) The functions described in items (5) and (6) of the Westinghouse submittal should be listed at the beginning of the Design Description.

The introductory paragraph contains general information that is not subject to inspection, test or analysis. The numbered section of the Design Description contains those functions for which specific inspections, tests or analyses are to be provided. Items 5 and 6 belong in the numbered section because they describe functions to be verified by inspections, tests and analyses.

b) The following should be added to describe the defense-in-depth function: "Provides cooling for the in-containment refueling water storage tank".

Defense-in-depth functions are defined as those which prevent actuation of the passive safety systems, when such actuation is onerous. The IRWST cooling function is intended to delay or prevent steaming to containment for postulated scenarios where the onerous actuation of a passive safety system (the Passive RHP heat exchanger) has already occurred. Therefore, it is not a defense in depth function.

2. Location of System

The building in which the system is located (e.g., containment, reactor building, etc.) should be identified.

The pilot ITAAC did not specify the location of systems because some systems span more than one building, and because the location is not generally relevant to the system's function. We do agree to the relevance of an ITAAC stating that Seismic Category 1 equipment is located in a Seismic Category 1 building. This was added in the November 7 ITAAC submittal.

3. Key design features of the system

a) Some features described in items (5) and (6) of the Westinghouse sub nittal should be included under this element. The capability of remote operation from the Remote Shutdown Workstation should be included under this element.

The first sentence seems to be based on a desire to make the ITAAC conform to the precise format of the fluid systems checklist in appendix C of the draft SRP. In fact, the draft SRP says only that the checklist information should be provided in a consistent order, not in the identical order given in the checklist. With respect to the second point, ITAAC 2.5.2 lists the minimum inventory of displays and fixed position controls to be provided at the Remote Shutdown Workstation.

b) The following key design features of the system should be included in the ITAAC:

1. *RNS has the heat removal capacity to cool the reactor coolant from 350 degrees F to 120 degrees F within 96 hours.*

   This feature does not meet the criteria for inclusion in the ITAAC.

2. *RNS contains a relief valves at the pump suction that provides LTOP for RCS when the RCS is connected to the RNS.*

   Low temperature overpressure protection for the RCS during refueling, startup and shutdown operations is already listed as a DID function. See design description item 6a of the pilot ITAAC or item 7a of the November 7 submittal.

c) The following key design feature of the system for protection against inter-system loss of coolant accidents should be added:

1. *RNS pressure retaining components shown on figure 3.3.7, except _____, have a design pressure of at least 900 psi.*

   Design description item 4a in the November 7 submittal states that the RNS design pressure is 900 psi.

4. Seismic and ASME code classification

a) The information in items (2) and (3) of the Westinghouse submittal covers this element and should be included.

This seems to say that the content of items 2 and 3 is acceptable, but that they should be re-numbered to conform to the format of the draft SRP checklist. As already stated, we do not believe that strict conformance to the checklist format is required.

5. System operation

a) The modes of operation (Plant Startup, Plant Shutdown, Refueling, Accident Recovery and Mid-Loop Operation) for this system should be identified.

The design description does identify the important modes of system operation. Design description item 6 in the pilot ITAAC (item 7 in the November 7 submittal) addresses the specific functions of the system and the applicable modes of plant operation.

6. Alarms, Displays and Controls

a) Alarms, displays and controls should not be limited to the "safety-related" components. Tables 3.3.7-3 and 3.3.7-4 should be expanded to include all the RNS alarms, displays and controls. Table 3.3.7-3 specifies no alarm for isolation valve position. It should be noted that it is important for the operator to know when an isolation valve is mis-aligned. The requirement for an alarm should be determined by functional requirement task analysis.

We are expanding the ITAAC treatment of instrumentation to include all post-accident monitoring channels, rather than just the Class 1E channels. This will include position indication for certain RNS isolation valves.

7. Logic

a) No automatic actuation logic is indicated in the SSAR for the RNS. If no automatic actuation logic is required, then the design description should include a statement that the RNS is manually aligned and actuated.

The CDM identifies those important system functions that are required, including automatic actuation when applicable. It does not identify situations where automatic actuation is not required. In a legal sense, that might imply that we have a duty to also identify other things that are not required. Obviously, such a list could be endless. Strict discipline is necessary on this point to avoid ambiguity in the legal meaning of the CDM.

8. Interlocks

a) Table 3.3.7-5 lists valves which have interlocks for opening. This table should include the interlock signals, logic and power supply arrangement.

The detailed inputs to and logic of safety-grade interlocks are covered by the Protection and Safety Monitoring System (PMS) ITAAC. Regarding the power supply arrangement, see item 9 below.

9. Electrical Power Sources

a) Table 3.3.7-4 should identify the power source division for each component.

The November 7 submittal contains commitments for power supply separation of Class 1E equipment.

10. Equipment to be Qualified for Harsh Environments

a) The equipment qualification should be identified for those components located in harsh environments.

The November 7 submittal includes this information.

11. Interface Requirements

a) The interface requirements should be identified.

This does not apply, since no part of the RNS is outside the scope of Design Certification.

12. Accessibility for ISI testing and inspection

a) Not addressed in submittal.

The fluid systems checklist in Appendix C of the draft SRP states that accessibility does not have to be addressed in Tier 1.

13. Numeric performance values

a) Not addressed in submittal.

Acceptance criteria 6a, 6b and 6c of the pilot ITAAC (7a, 7b and 7c of the November 7 submittal) provide numeric performance values for important system functions.

Miscellaneous Comments on the Design Description

a) Item #1 in the submittal uses the term "functional arrangement" instead of "basic configuration".

See our response to item 4 of the June 27 letter.

b) There is no discussion about pump testing or pump net positive suction head requirements in the design description.

ITAAC number 7b of the November 7 submittal does test RNS pump flow rate. This is necessary to verify the Defense in Depth (DID) function of heat removal. Unlike the evolutionary plants, the AP600 RHR pumps have no active safety function. According to the two-tiered approach, the AP600 ITAAC should therefore call for less pump testing than the evolutionary plants. We therefore test only the parameter most directly related to the DID function (e.g., flow rate) and not other parameters such as available NPSH.

c) The first sentence of Section 3.3.7 in the Westinghouse submittal where it states that the RNS is a non-safety system should be modified to identify that the RNS is a defense-in-depth system.

We have concluded that it is imprecise and misleading to refer to an entire system as either safety related or defense in depth. Systems with predominantly safety functions can have non-safety grade components, and systems with predominantly non-safety functions can have containment isolation valves or other safety grade components. In order to avoid ambiguity, the November 7 submittal eliminates all such sweeping references to the classification of entire systems.

d) Item #7b in the Westinghouse submittal should be clarified to include that the controls also exist at the remote shutdown panel for operation of the valves.

As previously discussed, ITAAC 2.5.2 of the November 7 submittal lists the minimum inventory of displays and fixed position controls to be provided at the Remote Shutdown Workstation.

e) SSAR Section 5.4.7.2, page 5.4-43, second paragraph states: "Once inside containment, the common discharge header contains a check valve that acts as a containment isolation valve." If this valve is used for a safety related active function then the following clarification should be made in the design description: "Check valves _____ shown on figure 3.3.7 will open, or will close, or will open and close, under system pressure, fluid flow conditions, or temperature conditions."

ITAAC item 10a in the November 7 submittal commits to exercise testing of active check valves.

Comments on Figures and Tables

1. Figure 3.3.7

a) Only one make up connection to the RNS heat exchanger is shown. The make up connection to the RNS heat exchanger B should also be shown.

There is only one make up connection. Redundancy in this connection is not required, since the design basis for post-72 hour actions excludes single failure of manual valves.

b) *No instruments are shown. Show pressure and flow indicators at the pump and temperature indicators at the heat exchanger inlet and outlet.*

See the response to item 6 under "Review Against Draft SRP". Only post-accident monitoring instruments merit Tier 1 treatment. In those cases we have selected to list the instruments on the tables rather than show them on the figures as the evolutionary plants did. We believe this treatment is more precise.

c) *Pump minimum flow lines should be shown.*

The minimum flow line is for pump protection only. It is not directly related to the Defense-in-Depth functions identified in the design description, and therefore should not be included on the figure.

d) *The CVS letdown line and valve V-029 should be shown.*

The CVS connection does not meet any of the criteria for inclusion in Tier 1.

e) *Since RNS controls are provided in the remote shutdown panel they should be shown on the figure. There should be a note to state that the controls and indications are in the control room as well as the remote shutdown panel.*

Even the evolutionary plant ITAAC figures do not contain this information. The figures are not intended to convey the presence or absence of controls at the remote shutdown workstation or in the main control room. As stated above, we have provide separate ITAAC covering the human-system interface and the minimum inventories or instruments and controls.

2. *Table 3.3.7-1*

a) *The RNS pump motors should be included in the major seismic category 1 equipment list since the pumps are included.*

Only the RNS pump pressure boundary is safety class 3 and seismic category 1. Since it is not an active pump, the motor is not seismically qualified.

3. *Table 3.3.7-3*

a) *Why are valves V-001A and V-001B excluded from the table?*

This was an oversight that has been corrected in the November 7 submittal.

4. *Table 3.3.7-4*

a) *Safety related check valves such as V-013 should be added to the table.*

This has been corrected in the November 7 submittal.

5. *Table 3.3.7-6 (ITAAC)*

a) *Item #1 in the submittal, the term "functional arrangement" should be changed to "basic configuration".*

See our response to item 4 of the June 27 letter.

b) *Item #2b in the submittal under Acceptance Criteria - specify ASME Code Section III if that applies.*

This has been done in the November 7 submittal.

c) *The last sentence of Item #4a of the submittal states "...for the time required to perform its safety function". This sentence is subject to interpretation since the time is not specified. A definitive performance measure needs to be provided.*

The time requirements are provided in Tier 2.

d) *The table goes from item #5 to item #5c. Are items 5a and 5b omitted?*

Yes. Item 5a and 5b of the pilot directed the reader to other ITAAC for the acceptance criteria, and were therefore not listed in the table. This seemed to confuse readers, and has been changed in the November 7 submittal.

e) *The acceptance criteria for item 5c should specify the pump flow required for long term post accident makeup to the RCS.*

The RNS pump does not provide this makeup. The function of the RNS is only to provide a connection whereby makeup can be added.

f) *The acceptance criteria for item 6a should identify the Tier 2 section where the valve vent area of 5.4 square inches is specified.*

Tier 1 must not reference tier 2 material directly. This is necessary to preclude inadvertently elevating tier 2 documents to tier 1 status, and is clearly recognized in the draft SRP.

g) *The acceptance criteria for item 6b should identify the tier 2 section where the heat removal capability of 12.6 million BTU/hr-F is specified. SSAR Table 5.4-14 specifies 14.2 million BTU/hr-F as the design capacity.*

As explained above, tier 1 must not contain direct references to tier 2. Regarding the heat removal values, the number in tier 2 refers to the heat exchanger's design capacity and includes a generous margin above the actual required value. Clearly this would be an inappropriate value to use for a test acceptance criteria. In general, tier 1 criteria will differ from nominal design numbers given in tier 2 according to the amount of margin provided in the design.

h) *The acceptance criteria for item 6c should identify the tier 2 section where the pump flow of 925 gpm is specified.*

As explained above, tier 1 must not contain direct references to tier 2, and design numbers in tier 2 may differ from the test acceptance criteria in tier 1.

i) *For item 7a the term "safety related" should be deleted because the ITAAC includes the safety grade and non-safety grade displays in the control room.*

As stated above, we are expanding the treatment of instrumentation to include both safety-related and non safety-related channels. We will probably continue to provide separate ITAAC, to ensure that the distinction is maintained.

j) *Item 7b should include RNS pump controls with the MOV controls.*

The November 7 submittal includes ITAAC on pump controls.

k) *The following items should be added to the ITAAC table:*

1. *RNS limits the in-containment refueling water storage tank temperature to less than boiling temperature during extended operation of the passive RHR and to not greater than 120 degrees F during normal operation.*

As stated in the response to item 1b under "Review Against Draft SRP", this is not a Defense-in-Depth function of the RNS and should not be covered by the ITAAC.

2. *RNS pumps can be tested at design flow during normal operation.*

There is no requirement to perform inservice testing of these pumps, since they have no safety function.

3. *An item addressing verification of RNS pump required net positive suction head.*

Please see our response to comment b under "Miscellaneous Comments on the Design Description".

4. *An item addressing verification of RNS pump flow and pump total dynamic head during shutdown cooling operation.*

The November 7 submittal contains a commitment to test pump flow in the shutdown cooling alignment. Provided that adequate flow is obtained, pump head is not directly relevant to the cooling function.

5. *Verification of valve interlocks specified in table 3.3.7-5*

The RNS valve interlocks are tested as part of the PMS ITAAC.

6. *Add an item stating that RNS pressure retaining components shown on figure 3.3.7 except _____ have a design pressure of at least 900 psi.*

The November 7 submittal contains this commitment.

7. *An item that addresses that the RNS pump suction line is self venting with a continually upward slope from the pump suction to the hot leg.*

As previously stated, the AP600 RHR pumps have no active safety function and are therefore treated in less detail than for the evolutionary plants.

Comments on AP600 Pilot ITAAC (August 8 Letter)

Passive Containment Cooling System - Electrical Engineering Branch Comments

It appears that Westinghouse has decided to address the issue of electrical independence between Class 1E divisions and between Class 1E divisions and non Class 1E equipment differently than the evolutionary designs.

1) *Why did the AP600 approach change from the evolutionary plants' approach?*

The inspection for independence/separation of electrical equipment is described in the building ITAAC rather than the individual system ITAACs because that is more consistent with the way separation is actually implemented in the plant. For example, ITAAC 3.3 "Nuclear Island Buildings" includes commitments to inspect cable raceways to ensure that each raceway contains only cables from its assigned divisions and that the required separation between raceways is provided. This inspection is conducted on an area-by-area basis, not a system-by-system basis.

2) *The evolutionary plants' approach referred to non-Class 1E equipment, where the AP600 refers to divisions. Is all non-Class 1E equipment in the AP600 design in divisions?*

This language has been corrected in the November 7 submittal. It is incorrect to refer to non-Class 1E divisions.

Passive Containment Cooling System - Civil Engineering & Geoscience Branch Comments on Table 3.2.3-6

Comments 1 through 9.

The first nine comments in this section give the precise wording that the reviewer wants for the applicable ITAAC section, but do not explain what is wrong with the existing words or give a reason why they should be changed. While we considered these comments in the November 7 submittal, we may not have had a full appreciation of the thinking behind the suggested wording.

10. *Since check valves are shown in Figure 3.2.3-1, the ITAAC Table 3.2.3-6 should include an item for check valves.*

A commitment for exercise testing of active check valves is provided in the November 7 submittal.

11. Figure 3.2.3-1

This figure may require a revision to be consistent with the staff's understanding of the latest design of the PCS. In a July 17, 1996 meeting, Westinghouse informed the staff that the PCS now contains a safety-related piping system extending from the Passive Containment Cooling Water Storage Tank to the Spent Fuel Pool, which might be used under certain conditions. The ITAAC Figure 3.2.3-1 and SSAF Figure 6.2.2-1 should be revised to include this piping system.

This design change had not been formally approved at the time the pilot ITAAC or the November 7 submittals were written. It is currently in process and will be incorporated into the appropriate design and licensing documents after approval.

Normal Residual Heat Removal System

These comments (and our responses) are identical to those on the PCS.

Non-Class 1E DC and UPS System

.....Items 2d, 2e and 2f state that each load group battery supplies its dc switchboard bus load for a period of 1 hour without recharging.....Section 8.3.2.1.2, "Non-Class 1E DC and UPS System" paragraph 5 of the Safety Analysis Report (SAR) states that the batteries are sized to supply the system loads for a period of at least two hours after loss of all ac power sources. This statement contradicts the Design Description, Design Commitment, and Acceptance Criteria for the ITAAC review. Westinghouse should address this inconsistency.

As explained above, numbers in tier 2 usually refer to a component's design capacity and include a generous margin above the actual required value. In general, tier 1 criteria will differ from nominal design numbers given in tier 2 according to the amount of margin provided in the design. This is not a contradiction but an essential difference between design parameters and test acceptance criteria.

The abbreviation "EDS" used in the Pilot ITAAC for the Non-Class 1E DC and UPS System is not used in the SAR and should therefore be taken out of the Design Description and ITAAC. The Design Description and ITAAC must be based only on information in the SAR.

While we agree that tier 1 information should be a subset of tier 2, there are a number of terms used in tier 1 that do not appear in tier 2. One example would be the term "basic configuration" in the evolutionary plant submittals. Provided these terms and acronyms are defined in section 1 of the ITAAC, there should not be any objection to the practice. The EDS acronym is defined in section 1.4 of the November 7 submittal.