October 1, 1992

Docket No. 52-001

APPLICANT: GE Nuclear Energy (GE)

PROJECT: Advanced Boiling Water Reactor (ABWR)

SUBJECT: SUMMARY OF MEETING WITH GE ON SEPTEMBER 9 AND 10, 1992

A public meeting was held between the Nuclear Regulatory Commission (NRC) staff, GE and the Nuclear Management and Resources Council (NUMARC) at GE offices in San Jose, California, on September 9 and 10, 1992. The purpose of this meeting was to discuss issues related to the industry and staff review of the ABWR inspections, tests, analyses, and acceptance criteria (ITAAC). Enclosure 1 contains a list of those who attended.

GE and industry representatives reviewed the Tier 1 material for the standby liquid control system (SLCS). The staff clarified its comments on the Tier 1 material provided to GE in a letter dated August 12, 1992. Examples of the changes that GE is considering for the SLCS ITAAC, based on industry input, are indicated in Enclosure 2. The staff will evaluate the changes when GE submits a revised Tier 1 submittal to the NRC.

Several other systems were also reviewed during the remainder of the meeting. In addition, presentations were given on various issues associated with the development and implementation of the Tier 1 material for the ABWR. The NRC staff presented the material contained in Enclosure 3, and GE presented the material contained in Enclosure 4.

(original signed by)
Thomas H. Boyce, Project Manager
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Enclosures:
As stated

cc w/enclosures:
See next page

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Enclosure 1

ABWR TIER 1/ITAAC REVIEW

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Mark Sanford	TVA
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*Actually Present at Meeting

Enclosure 2

UTILITY REVIEW MEETING
9/9/92 - 10/2/92

ITAAC SUMMARY

STANDBY LIQUID CONTROL
(2.2.4)

DESIGN DESCRIPTION ENTRIES:

- INJECT NEUTRON ABSORBING POISON INTO REACTOR
- AUTOMATIC INITIATION ON ATWS SIGNAL
- KEY EQUIPMENT PERFORMANCE AND ASME CODE REQUIREMENTS GIVEN
- COMPONENTS REQUIRED FOR INJECTION ARE SEISMIC CATEGORY I
- SIMPLIFIED SYSTEM DIAGRAM

ITAAC ENTRIES:

1. POISON REQUIREMENTS
2. BASIC SYSTEM CONFIGURATION
3. PUMP DESIGN LIMITS
4. IN-SERVICE FUNCTIONAL TESTS
5. ELECTRICAL POWER REQUIREMENTS
6. ASME CODE CLASSIFICATION
7. HYDROSTATIC TEST REQUIREMENTS
8. CONTROL ROOM INDICATORS

PFB

2.2.4 Standby Liquid Control System

The Standby Liquid Control (SLC) System is designed to inject neutron absorbing poison using a boron solution into the reactor and thus provide back-up reactor shutdown capability independent of the normal reactivity control system based on insertion of control rods into the core. The SLC System is capable of operation over a ~~wide~~ range of reactor pressure conditions up to and including the elevated pressures associated with an anticipated plant transient coupled with a failure to scram (ATWS).

The SLC System is designed to bring the reactor, at any time in a CORE cycle, and at ~~all~~ DESIGN BASIS conditions, from full power to a subcritical condition, with the reactor in the most reactive xenon-free state, without control rod movement. WITH THE STORAGE TANK AT MINIMUM LEVEL, The system will inject the minimum required boron solution ~~in~~ WITHIN 61 minutes OF INITIATION OF INJECTION, AND BOTH PUMPS OPERATING.

The SLC System (Figure 2.2.4) consists of a boron solution storage tank, two positive displacement pumps, two motor-operated injection valves which are provided in parallel for redundancy, and associated piping and valves used to transfer borated water from the storage tank to the reactor pressure vessel (RPV). The borated solution is discharged through the 'B' high pressure core flooder (HPCF) subsystem sparger. Key equipment performance requirements are:

(1)	Pump flow (minimum)	378 ℓ/min ~~100 gpm~~ with both pumps running
(2)	Maximum reactor pressure (for injection)	88.9 kg/cm²a ~~1250 psig~~
(3)	Pumpable volume in storage tank (minimum)	23.1 m³ ~~6100 U.S. gal~~

~~The required volume of solution contained in the storage tank is dependent upon the solution concentration, and this concentration can vary during reactor operations. A required boron solution volume/concentration relationship is used to define acceptable SLC System storage tank conditions during plant operation.~~

The SLC System is automatically initiated during an ATWS. An ATWS condition exists when either of the following occurs:

(1) High RPV pressure 80.1 kg/cm²a ~~(1125 psig)~~ and Average Power Range Monitor (APRM) not down scale for 3 minutes, or

(2) Low RPV level (Level 2) and APRM not down scale for 3 minutes.

When the SLC S tem is automatically initiated to inject a liquid neutron absorber into the reactor, the following devices are actuated:

(1) The two injection valves are opened.

(2) The two storage tank discharge valves are opened.

(3) The two injection pumps are started.

(4) The reactor water cleanup isolation valves are closed.

The SLC System can is also designed to be manually initiated from the main control room. When it is manually initiated to inject a liquid neutron absorber into the reactor, the following devices are actuated by each switch.

(1) One of the two injection valves is opened.

(2) One of the two storage tank discharge valves is opened.

(3) One of the two injection pumps is started.

(4) One of the reactor water cleanup isolation valves is closed.

The SLC System provides borated water to the reactor core to compensate for the various reactivity effects during the required design basis conditions. These effects include are xenon decay, elimination of steam voids, changing water density due to the reduction in water temperature, Doppler effect in uranium, changes in neutron leakage, and changes in control rod worth as boron affects neutron migration length. To meet this objective, it is necessary to inject a quantity of boron which produces a minimum concentration of INSERT #1 850 ppm of natural boron in the reactor core at 70°F. To allow for potential leakage and imperfect mixing in the reactor system, an additional 25% (220) is added to the above requirement. The required concentration is thus achieved, accounting for dilution in the RPV with normal water level and including the volume in the RHR shutdown cooling piping. This quantity of boron solution is the amount which is contained above the pump suction shutoff level in the tank, thus allowing for the portion of the tank volume which cannot be injected. (3 m³)

The pumps are capable of producing discharge pressure to inject the solution into the reactor when the reactor is at high pressure conditions corresponding to the system relief valve actuation (1560 psig) 110.7 kg/cm² a, which is above peak ATWS pressure.

The SLC System includes sufficient utilizes the following control room indications to allow for the necessary monitoring and control during design basis operational conditions: This includes pump discharge pressure, storage tank liquid level and temperature, as well as valve open/close and pump on/off indication for those components shown on Figure 2.2.4 (with the exception of the ~~simple~~ check valves).

The SLC System uses a dissolved solution of sodium pentaborate as the neutron-absorbing poison. This solution is held in a storage tank which has a heater to maintain solution temperature above the saturation temperature. The heater is capable of automatic operation and automatic shutoff to maintain ~~an acceptable~~ solution temperature between 24°C and 30°C. The SLC System solution tank, a test water tank, the two positive displacement pumps, and associated valving are ~~all~~ located in the secondary containment on the floor elevation below the operating floor. This is a Seismic Category I structure, and the SLC System equipment is THEREFORE protected from ~~phenomena such as~~ earthquakes, tornados, hurricanes, and floods. ~~as well as from internal postulated accident phenomena. In this area,~~ ADDITIONALLY, the SLC System is not subject to ~~conditions such as~~ THE missiles, pipe whip, and discharge OF fluids FROM OTHER SYSTEMS.

The SLCS pumps, heater, valves, and controls are powered from the standby power supply or normal offsite power. The pumps and valves are powered and controlled from separate buses and circuits so that single active failure will not prevent system operation. The power supplied to one motor-operated injection valve, storage tank discharge valve, and injection pump is powered from Division I, 480 VAC. The power supply to the other motor-operated injection valve, storage tank outlet valve, and injection pump is powered from Division II, 480 VAC. The power supply to the tank heaters and heater controls is connectable to a standby power source. The standby power source is ~~Class 1E~~ from an on-site CLASS 1E source and is independent of the off-site power.

Components of the SLC System which are required for injection of the neutron absorber into the reactor are classified Seismic Category I. The ~~major~~ mechanical components are designed to meet ASME Code requirements as shown below:

Component	ASME Code Class	Design Conditions Pressure	Design Conditions Temperature
Storage Tank	2	Static Head	~~150°F~~ 66°C
Pump	2	~~1560 psig~~ 110.7 kg/cm²a	~~150°F~~ 66°C
Injection Valves	1	~~1560 psig~~ 110.7 kg/cm²a	~~150°F~~ 66°C
Piping Inboard of Injection Valves	1	~~1250 psig~~ 88.9 kg/cm²a	~~575°F~~ 302°C

Piping and components not required for the injection of the neutron absorber (e.g., test tank, sampling system line, and storage tank vent) are classified Non-Nuclear Safety (NNS).

~~Design provisions to~~ permit system testing ~~include~~ A test tank and associated piping and valves. The tank ~~can be~~ supplied with demineralized water which ~~can be~~ is pumped in a closed loop through either pump or injected into the reactor.

The SLC System is separated both physi   y and electrically from the Control Rod Drive System.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.2.4 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria, which will be undertaken for the SLC System.

INSERT #1: 1320 ppm, THE SUM OF THE MINIMUM BORON CONCENTRATION TO ACHIEVE SHUTDOWN CONDITION (850 ppm), 25% IMPERFECT MIXING MARGIN (220 ppm), AND THE DILUTION MARGIN OF THE ~~RHR~~ RESIDUAL HEAT REMOVAL (RHR) PIPING (250 ppm). AT LEAST

CDC

1. THE SLC SYSTEM INJECTS BORON SOLUTION WHICH PRODUCES A MINIMUM CONCENTRATION OF 1320 ppm, THE SUM OF THE MINIMUM BORON CONCENTRATION TO ACHIEVE COLD SHUTDOWN (850 ppm); AN IMPERFECT MIXING MARGIN (220 ppm), AND A DILUTION MARGIN (250 ppm).

AC

1. REPEAT CDC #

   THIS CONCENTRATION IS ACHIEVED UNDER SYSTEM DESIGN BASIS CONDITIONS.

   THIS REQUIRES...,

Table 2.2.4: Standby Liquid Control System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The minimum average NATURAL BORON poison concentration in the reactor after operation of the SLC System ~~shall be equal to or greater than 850 ppm.~~ IS AT LEAST 850 ppm. THE TANK CONCENTRATION IS, THEREFORE, AT LEAST 1320 ppm, THE SUM OF THE MINIMUM BORON CONCENTRATION TO ACHIEVE COLD SHUTDOWN (850 ppm), AND AN IMPERFECT MIXING MARGIN (220 ppm), AND A DILUTION MARGIN (250 ppm).	1. A REVIEW OF Construction records, ~~revisions~~ and plant visual examinations will be undertaken to assess as-built parameters listed below for compatibility with SLC System design calculations. If necessary, an as-built SLC System analysis will be conducted to demonstrate that the acceptance criteria are met. **Critical Parameters:** a. Storage tank pumpable volume b. RPV water inventory at ~~70°F~~ 21°C c. RHR shutdown cooling system water inventory at ~~70°F~~ 21°C	THE SLC SYSTEM INJECTS A NATURAL BORON POISON SOLUTION AT A MINIMUM CONCENTRATION OF 1320 ppm, THE SUM OF THE MINIMUM CONCENTRATION TO ACHIEVE COLD SHUTDOWN (850 ppm), AN IMPERFECT MIXING MARGIN (220 ppm) AND A DILUTION MARGIN (250 ppm). 1. ~~It must be shown the SLC System can achieve a poison concentration of 850 ppm or greater, assuming a 25% dilution due to non-uniform mixing in the reactor and accounting for dilution in the RHR shutdown cooling systems. This~~ MINIMUM AVERAGE concentration OF 850 ppm must be achieved ~~under system design basis conditions.~~ IN THE REACTOR This requires that the SLC System meet the following values: a. Storage tank pumpable volume range ~~6100-6800 gal.~~ 23.1 - 25.7 m^3 b. RPV water inventory ≤ ~~1.00×10^6 lb~~ 455×10^3 kg c. RHR shutdown cooling system inventory ≤ ~~0.287×10^6 lb~~ 130×10^3 kg
2. A simplified system configuration ~~is shown in Figure 2.2.4.~~ FOR THE SLC SYSTEM IS DESCRIBED IN SECTION 2.2.4.	2. Inspections of installation records AND ~~together with plant walkdowns, will be conducted to confirm that the installed equipment is in compliance with the design configuration defined in Figure 2.2.4.~~ VISUAL PLANT INSPECTIONS OF THE CONFIGURATION OF THE SLC SYSTEM WILL BE CONDUCTED.	2. The AS-BUILT system configuration is in accordance with ~~Figure 2.2.4.~~ THE DESCRIPTION IN SECTION 2.2.4.

Table 2.2.4: Standby Liquid Control System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The SLC System ~~shall be capable of delivering 100 gpm~~ DELIVERS AT LEAST 379 l/min of solution with both pumps operating against the elevated pressure conditions which can exist in the reactor during events involving SLC System initiation.	3. System preoperation tests will be conducted ~~to demonstrate acceptable~~ OF pump and system performance. These tests will ~~involve establishing test~~ conditions that simulate conditions which will exist during an SLC System design basis event. To demonstrate adequate Net Positive Suction Head (NPSH), delivery of rated flow will be confirmed by tests conducted at conditions of low level and maximum temperature in the storage tank, and the water will be injected from the storage tank to the RPV. Manual initiation of the SLCS will also be tested.	3. It must be shown that the SLC System can automatically inject ~~100 gpm~~ ≥ 378 l/min (both pumps running) against a reactor pressure of ~~1250~~ 51.9 kg/cm²a ~~psig with simulated ATWS conditions~~ on upon receipt of the manual initiation signal of the SLC. It must also be shown that the SLC System pumps can pump the entire storage tank pumpable volume AT ≥ 189 l/min.
4. The system is designed to permit in-service functional testing of the SLC System.	4. Field tests will be conducted after system installation to confirm that in-service system testing can be performed.	4. Using ~~normally~~ installed controls, power supplies and other auxiliaries, the system ~~has the capability to~~ performs: a. Pump tests in a closed loop on the test tank. b. RPV injection tests using demineralized water from the test tank.
REPLACE WITH OTHER 5 5. The pump, heater, valves and controls can be powered from the standby AC power supply as described in Section 2.2.4.	5. System tests will be conducted after installation to confirm that the electrical power supply configurations are in compliance with design commitments.	5. ~~The installed equipment~~ PUMP, HEATER, VALVES, AND CONTROLS can be powered from the standby AC power ~~supply~~ AS DESCRIBED IN SECTION 2.2.4.
~~6. SLC System components which are required for the injection of the neutron absorber into the reactor are classified Seismic Category I and qualified for appropriate environment for locations where installed.~~ 6. PORTIONS OF THE SLC SYSTEM ARE CLASSIFIED AS ASME CODE CLASS AS INDICATED IN SECTION 2.2.4. THEY ARE DESIGNED, FABRICATED, INSTALLED, AND INSPECTED IN ACCORDANCE WITH THE ASME CODE, SECTION III.	~~6. See Generic Equipment Qualification verification activities (ITA).~~ 6. ASME CODE DATA REPORTS WILL BE REVIEWED AND INSPECTIONS OF CODE STAMPS WILL BE CONDUCTED FOR ASME COMPONENTS IN THE SLC SYSTEM.	~~6. See Generic Equipment Qualification Acceptance Criteria (AC).~~ 6. THOSE PORTIONS OF THE SLC SYSTEM IDENTIFIED AS ASME CODE CLASS IN SECTION 2.2.4 HAVE ASME CODE SECTION III CODE DATA REPORTS AND CODE STAMPS (OR ALTERNATIVE MARKINGS PERMITTED BY THE CODE.

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The SLC system operates when powered from either normal off-site or emergency on-site sources.	5. SLC System functional tests shall be performed to demonstrate operation when supplied by either normal off-site power or the emergency diesel generator(s).	5. SLC System operates when supplied by either normal off-site sources or the emergency diesel generators.
6. Each loop of the ______ system is mechanically and electrically separate.	6. Construction records will be reviewed and visual inspections will be performed of the mechanical and electrical separations of the ______ loops.	6. Any room outside the primary containment does not contain components from more than one loop of the ______ system. Each loop of the ______ system is supplied by elecrical power from only one division of elecrical power, and this division is different from the divisions supplying the other loops of the ______ system. (Except for the shutdown cooling suction line isolation valves.)

C O

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A simplified configuration for the ______ is described in Section ______.	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the ______.	1. The as-built configuration of the ______ is in accordance with the description in Section ______
2. Portions of the ______ are classified as ASME Code class as indicated in Section ______. They are designed, fabricated, installed, and inspected in accordance with the ASME Code, Section III.	2. ASME Code Data Reports will be reviewed and inspections of Code stamps will be conducted for ASME components in the ______.	2. Those portions of the ______ identified as ASME Code class in Section ______ have ASME Code Section III, Code Data Reports and Code stamps (or alternative markings permitted by the Code).
~~3~~ 7. The ASME portions of the SLCS retain their integrity under internal pressures that will be experienced during service.	~~3~~ 7. A hydrostatic test of the ASME portions of the SLCS will be conducted.	~~3~~ 7. The results of the hydrostatic test of the ASME portions of the SLCS conform with the requirements in the ASME Code, Section III.
~~4~~ 8. Control room indicators are provided for SLC system parameters defined in Section 2.2.4.	~~4~~ 8. Inspections will be performed to verify the presence of control room indicators for the SLC system.	~~4~~ 8. Instrumentation is present in the Control room as defined in Section 2.2.4.

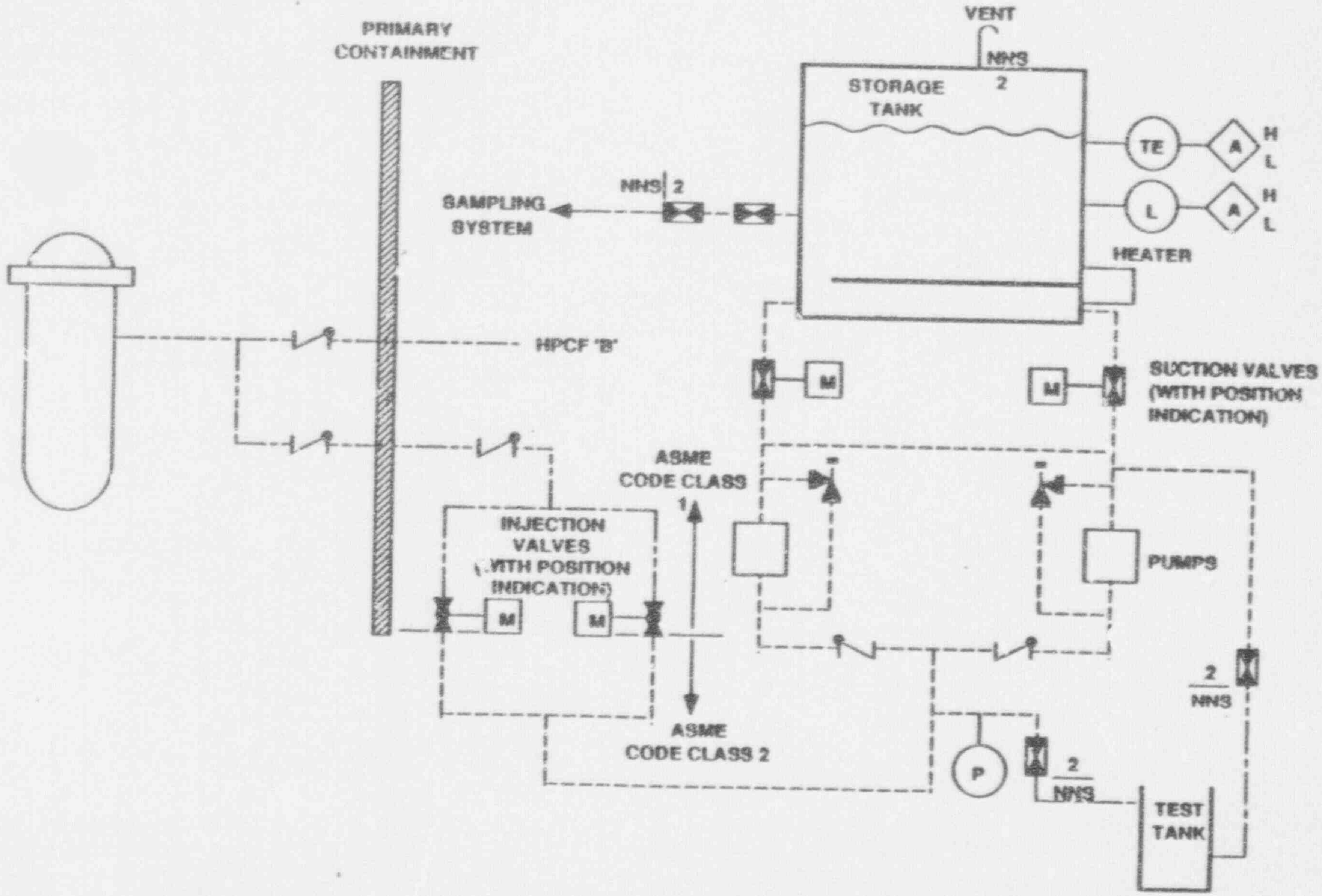


Figure 2.2.4 Standby Liquid Control System (Standby Mode)

Proposed Disposition of NRC Comments on SLCS ITAAC

A. **Previous Comments by Reactor Systems Branch:**

1. GE Response accepted by NRC

2. GE Response accepted by NRC

3. The ITAAC invokes positive displacement pump testing under "simulated ATWS conditions." Correlation of the cold, pre-core test results to high temperature and pressure accident conditions must be developed.

   Previous GE Response: Detailed algorithms not appropriate for TIER 1. No changes proposed. See discussion under General Comment 1.

   Status: According to GE, detailed algorithms are not appropriate for ITAAC. We disagree. See response to general comment #1.

   GE Response: Since SLCS pumps will be tested at a pressure bounding the required ATWS pressures for SLCS operation, no detailed algorithms are needed. To eliminate ambiguity in the Acceptance Criteria, the expression "with simulated ATWS conditions" is deleted.

4. In the second paragraph on page 2.2-15, it is stated that "system will complete the injection of the boron solution in 50 to 150 minutes." The completion is given a very wide margin. Since it will be difficult to verify the completion time for different scenarios, the completion time should be given with a narrow margin for a specific scenario.

   Previous GE Response: GE has revised this discussion to relate injection times to two pump operations. This is included in Stage 3.

   Status: GE has revised the ITAAC design description to relate injection times to two pump operation. GE should revise the SSAR to be consistent with the ITAAC.

   GE Response: GE agrees.

5. Include in the design conditions pressure and temperature on page 2.2-17 and the relief valve actuation 1560 psig on the Table 2.2.4.

   Previous GE Response: See response to Specific RRS Comment No. 1. No changes proposed. From RRS #1:

   > Where appropriate, the GE approach has been to show compliance with design pressure and temperature conditions by an ITAAC aimed at confirming compliance with ASME code requirements.

   Status: GE response is not acceptable. Since the SLCS is a safety system, the important parameters should be included in the ITAAC table.

GE Response: An ITAAC related to compliance with ASME code requirements has been added to the table.

6. Add as item #7 to the table 2.2.4 "provision for control room alarms and indications vital for SLCS operation." Similar to item # 10 for RCIC.

Previous GE Response: To the extent called for by Tier 1, Item 2 of Table 2.2.4 covers this issue. No changes proposed.

Status: GE response is not acceptable. This is included for RCIC. It should be consistent.

GE Response: Control room indicators ITAAC has been added as Item 8.

B. The following new comments are from the Agency senior management. (REF: Memorandum from James H. Sniezek to Thomas E. Murley dated June 29, 1992).

1. Acceptance criteria #1 refer to 850 ppm and the SSAR refer to 800 ppm. this is not consistent. Correct the discrepancy. Also give the basis for the 25% dilution in the SSAR.

GE Response: The SSAR concentration requirements have been revised to be consistent with the ITAAC. The basis for the 25% dilution margin is an historic NRC approved margin for BWRs to account for possible imperfect mixing in the reactor system.

2. Revise the table 2.2.4 item #2 to show that the system configuration and construction drawings are in accordance with Tier 1 design commitments. Criteria should not specify that system configuration is in accordance with figure 2.2.4, because that simplified figure will not correspond in detail to as built system. This is a generic comment and applies to all systems.

GE Response: ITAAC Item #2 has been revised to show that the as-built design conforms with the system description.

3. On page 2.2.4 it is stated that "the system will inject the minimum required boron solution in 61 minutes". Change the SSAR also to be consistent with the ITAAC.

GE Response: GE agrees to revise the SSAR to be consistent with the ITAAC.

4. SSAR figure 9.3-2 indicates storage tank pumpable volume range of 5760-7239 gallons. But the ITAAC acceptance criteria #1 indicates a storage tank pumpable volume range of 6100-6800 gallons. The SSAR and the ITAAC are not consistent. We require GE to correct the inconsistency and ensure that the tank allowable volume meets the 6100 gallon Tier 1 criteria.

GE Response: GE agrees to revise the SSAR to be consistent with the ITAAC.

5. In SSAR section 9.3.5.3 it is stated that "the specified boron injection rate is limited to the range of 8 to 20 ppm/min." But in the ITAAC only the minimum boron injection rate of 100 gpm is given. The SSAR and the ITAAC is not consistent. The minimum boron injection rate required by the ATWS rule 10 CFR 50.62 is 100 gpm. The SSAR should be revised to indicate the minimum boron injection rate of 100 gpm only.

   GE Response: The minimum boron injection rate described in the SSAR corresponds to that required for the system to meet the requirements of GDC 26 as the second reactivity control system. The ATWS rule requires two pump (100 gpm) operation. No action taken.

6. The ITAAC gives the design conditions of the system. But the SSAR include only the system operating conditions not the design conditions. The SSAR should be revised to include the system design conditions to be consistent with the ITAAC.

   GE Response: The design conditions for SLCS are given in the SSAR in the P&ID (Figure 9.3-1). No action taken.

C. **Incomplete Comment [Not in formal submittal]**

1. In SSAR section 9.3.5.3, page 9.3-5 it is stated that "Only one of two standby liquid control pumps is needed for system operation." Also in SSAR Figure 9.3-1A, note #6 states that during modes A, B or C, only one pump is run. On page 2 of the ITAAC, it is stated that the two injection pumps are started automatically during ATWS.

   Revise the SSAR and ITAAC to explain the design requirements of the SLCS for design basis and ATWS. At present, the SSAR and ITAAC do not [rest of text missing]

   GE Response: The ITAAC Design Description gives the design basis for SLCS in the first two paragraphs and also describes the automatic operation during ATWS. Similar descriptions are also found in the SSAR Section 9.3.5 for SLCS. The SSAR and ITAAC are consistent and no actions are required.

D. **SLCS ITAAC DEFICIENCIES from "Graybeard" Committee Review**
   [Comments made on Stage 2 ITAAC.]

1. The SSAR states that the system is sized for injection in 60 to 150 minutes while the TIER 1 description states 50 to 150 minutes.

   GE Response: Corrected in Stage 3.

2. The SSAR states that 800 ppm concentration in the vessel is needed while the Tier 1 description states that 850 ppm is needed.

GE Response: See response to comment B.1

3. There is no minimum and maximum boron injection rates in the Tier 1 description while they are stated in the SSAR (8 to 20 ppm.min). It is unclear as to whether these values coincide with other ITAAC parameters.

GE Response: The ITAAC parameters correspond to the minimum boron injection rate for ATWS. As stated above by the NRC in Comment A.4; "Since it will be difficult to verify the completion time for different scenarios, the completion time should be given with a narrow margin for a specific scenario." No action taken.

4. The locked open valve with remote indication noted in SSAR section 9.3.5.4 isn't shown in the system P&ID.

GE Response: This valve is part of the High Pressure Core Flooder System and is shown in its P&ID. No action taken.

5. While the SSAR states that the system is automatically initiated or can be manually initiated, the ITAAC doesn't test the manual initiation.

GE Response: ITAAC Item #3 has been expanded to include testing of manual initiation of SLCS.

6. The Tier 1 description indicates that the system is independent of normal reactivity control, but this aspect isn't tested in the ITAAC.

GE Response: ITAAC Item 2 has been revised to cover this.

7. Figure 9.3-2 of the SSAR indicates a minimum tank volume of 5760 gallons while Tier 1 and the ITAAC indicate a minimum of 6100 gallons.

GE Response: See response to comment B.4.

8. The "functionality" of the tank heaters needs to be tested in the ITAAC. Currently, only the fact that the heaters can be powered by standby AC is tested.

GE Response: The NRC request is not compatible with GE's understanding of Part 52 because ITAAC is not intended to cover every system and component design requirement. Performance of the SLCS heaters is a Tier 2 requirement and is covered by the SSAR.

9. A better system diagram is needed in the ITAAC and the words in ITAAC relating to inspection to the diagram need to be changed. The inspection would probably be to the functions as depicted in the diagram.

GE Response: The level of detail in the SLCS diagram is consistent with that of other systems. The ITAAC has been revised to reflect the system description in the Design Document rather than just the figure.

10. The ITAAC test pressure needs to be changed from 1250 to 1560 psig.

    GE Response: The test pressure is 1250 psig because it bounds any pressure in which the SLCS would be required to inject. Pressures in excess of 1250 psig only occur for a brief initial time during an ATWS event and are reduced below 1250 psig by the time the SLCS pumps are operating. In addition, it would not be reasonable to test system operation at 1560 psig as that is the relief valve setpoint. No action taken.

11. The ITAAC needs to delineate "natural boron" vice "poison". The acceptance criteria of 850 ppm is unclear relative to the 25% dilution factor.

    GE Response: GE has revised the concentration requirements in ITAAC to clarify it.

12. The pumps should be tested as individual 50 GPM units in addition to the 100 gpm combined test.

    GE Response: Individual pump capacity of SLCS is a Tier 2 requirement and is covered by the SSAR. See also response to comment D.3 above. No action taken.

13. It was noted that the SLCS preop tests (SSAR 14.[illegible] 2) noted in SSAR 9.3.5.4 are currently insufficient. They need to be more detailed and have some top level performance criteria.

    GE Response: Comment is not related to ITAAC but is a SSAR design question. However, GE is currently evaluating the completeness of all the preop tests. No action taken.

14. The interlock that causes RWCU isolation upon actuation of SLCS isn't in the ITAAC.

    GE Response: The interlock is found under the ITAAC for RWCU. No action taken.

E. Additional questions from ACRS Staff Review

1. 2.2.4-1 Section 2.2.4, page 2.2.4-1 (6/1/92)

The forth paragraph states:

> The required volume of solution contained in the storage tank is dependent upon the solution concentration, and this concentration can vary during reactor operations. A required boron solution volume/concentration relationship is used to define acceptable SLC System storage tank conditions during plant operation. [Emphasis Added]

Some clarification as to design intent is needed here. Is the intent of this paragraph to make clear that the volume / concentration is not <u>one fixed value</u> "designed to bring the reactor, at any time in a cycle, and at all conditions,...." [as implied in the second paragraph]? Is the intent to provide a required volume / concentration relationship" against which to evaluate future "as found volume / concentration" values?

Without clarification the implication is that during plant operation the volume / concentration will be intentionally changed for some unstated reason.

<u>GE Response</u>: This paragraph will be deleted from ITAAC to remove the ambiguity. The SSAR (Tier 2) describes the volume / concentration requirements for SLCS. This paragraph does not conform with the intent of Tier 1 to only give the principle design criteria and avoid references to operating plant conditions. As stated earlier by the NRC in Comment A.4; "Since it will be difficult to verify the completion time for different scenarios, the completion time should be given with a narrow margin for a specific scenario." With that in mind, the ITAAC volume / concentration requirement in ITAAC corresponds to the minimum storage tank volume only.

2. 2.2.4-2 Section 2.2.4, page 2.2.4-1 thru -7 (6/1/92)

For earlier BWRs heat tracing was sometimes required on the piping. As I recall it was nuclear safety class and supplied with 1E electric power. There is no mention of heat tracing here. Has heat tracing been demonstrated not to be required?

<u>GE Response</u>: Comment is not related to ITAAC but is a SSAR design question. Heat tracing is required in earlier plants in order to keep the boron in the pipes from solidifying. Heat tracing is not required in ABWR because the pump suction valves are normally closed, and the piping does not contain boron. No action taken.

PRESENTER: TOM BOYCE
PROJECT MANAGER, NRR

SUBJECT: INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA (ITAAC) FOR THE GE ABWR

August 26, 1992

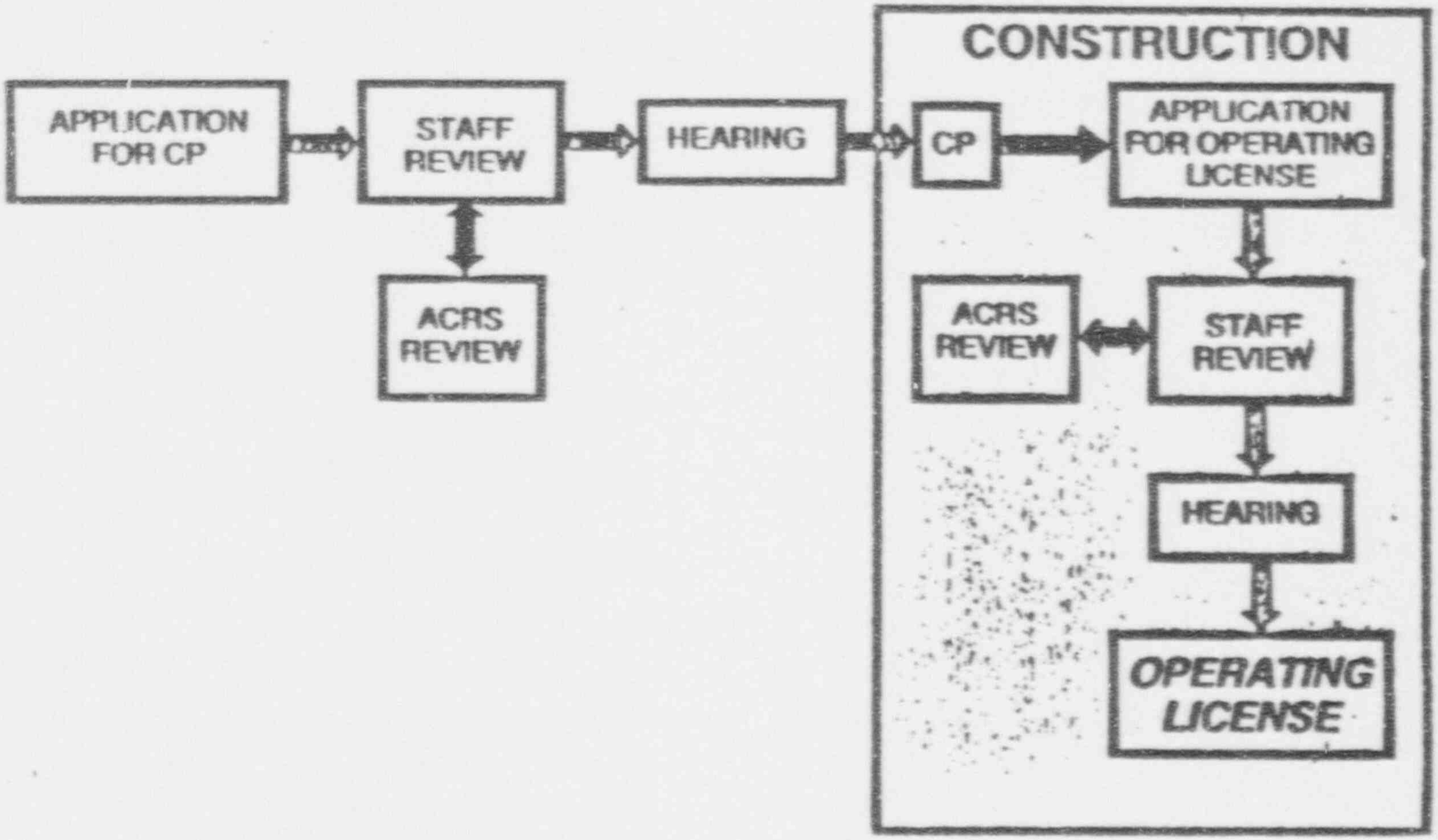
Enclosure 3

ITAAC FOR DESIGN CERTIFICATIONS

SUMMARY OF ITAAC STATUS

- STAFF AND INDUSTRY ARE DEVELOPING ITAAC, WITH SENIOR MANAGEMENT INVOLVEMENT
- GE ABWR IS THE LEAD DESIGN FOR ITAAC DEVELOPMENT
- ITAAC DEVELOPMENT CONTINUES TO BE ITERATIVE, AND MANY ISSUES UNDER DISCUSSION
- SOME INCONSISTENCIES HAVE BEEN NOTED IN SSAR/ITAAC
- ITAAC IMPLEMENT SEVERAL ASPECTS OF 10 CFR PART 52

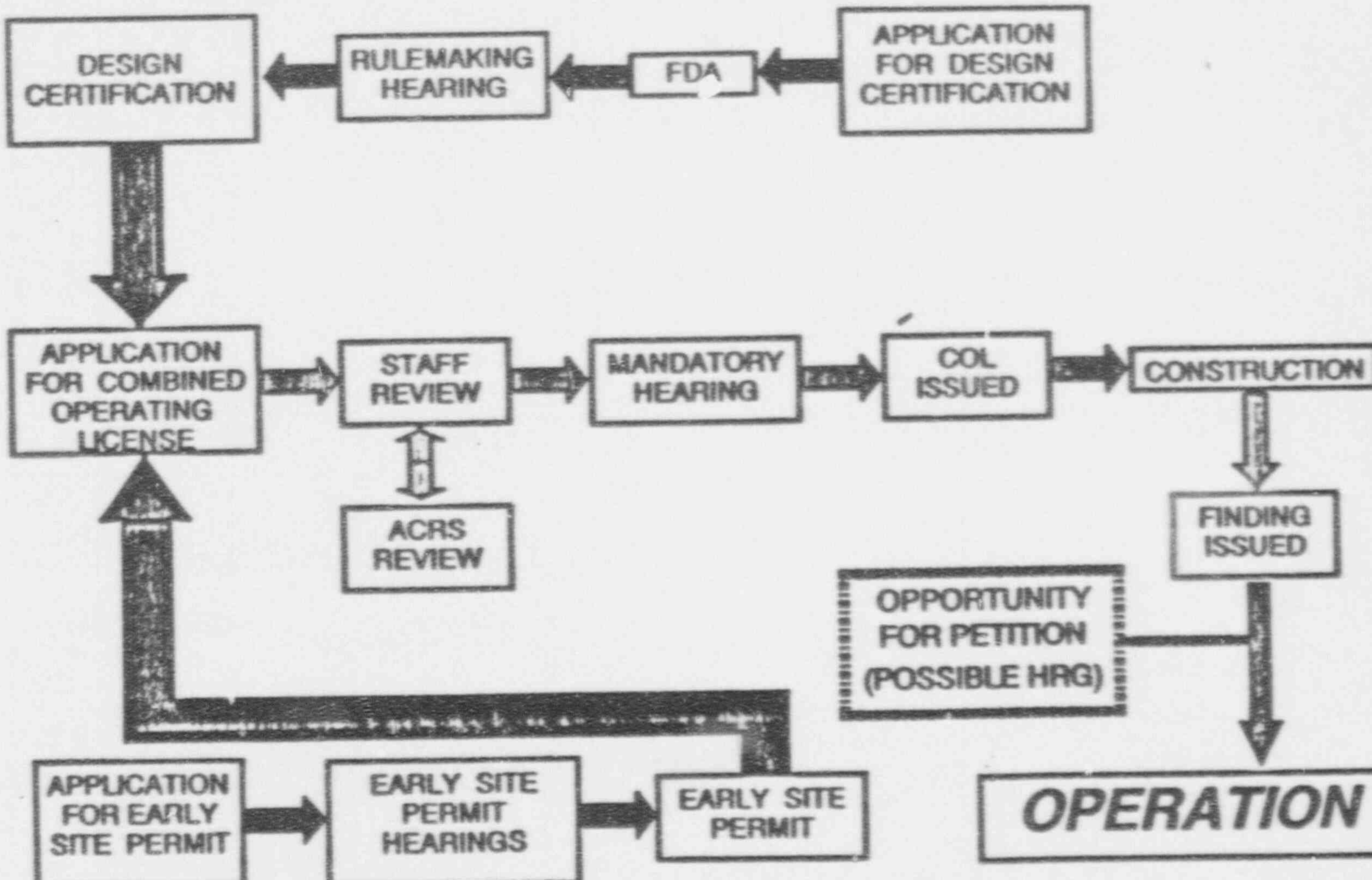
PART 50 LICENSING PROCESS



WHAT WERE THE PERCEIVED PROBLEMS WITH TWO-STEP LICENSING?

- FINAL SAFETY DECISIONS WERE NOT MADE UNTIL PLANT WAS COMPLETED
- CONSTRUCTION FREQUENTLY HAD TO WAIT FOR DESIGN
- MUCH CONSTRUCTION REWORK WAS NEEDED FOR DESIGN CHANGES AND SAFETY BACKFITS
- PUBLIC PARTICIPATION DIFFICULT AT CP BECAUSE FEW DESIGN DETAILS
- PUBLIC PARTICIPATION DIFFICULT AT OP BECAUSE PLANT WAS NEARLY COMPLETE

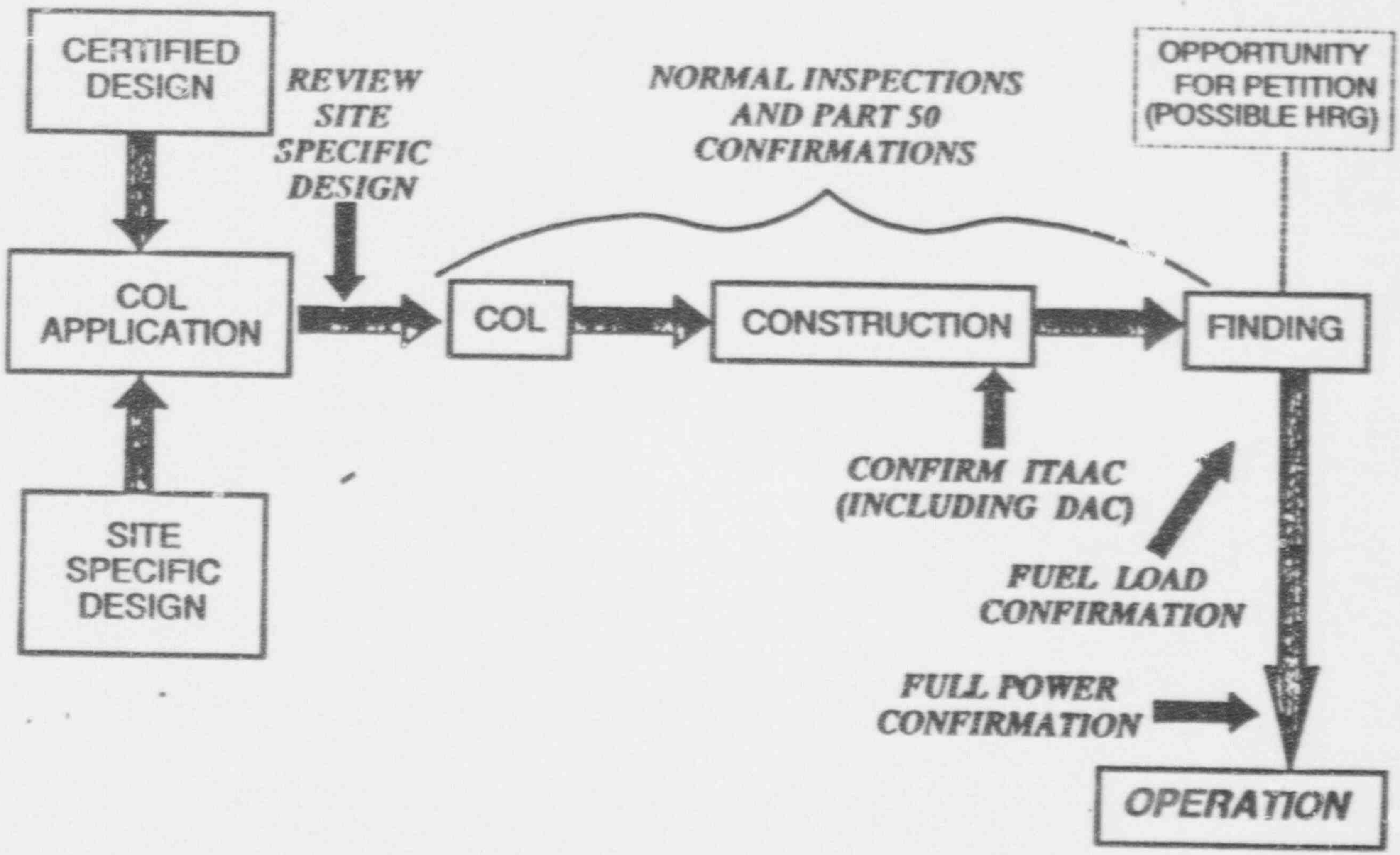
BASIC CERTIFICATION / LICENSING PROCESS

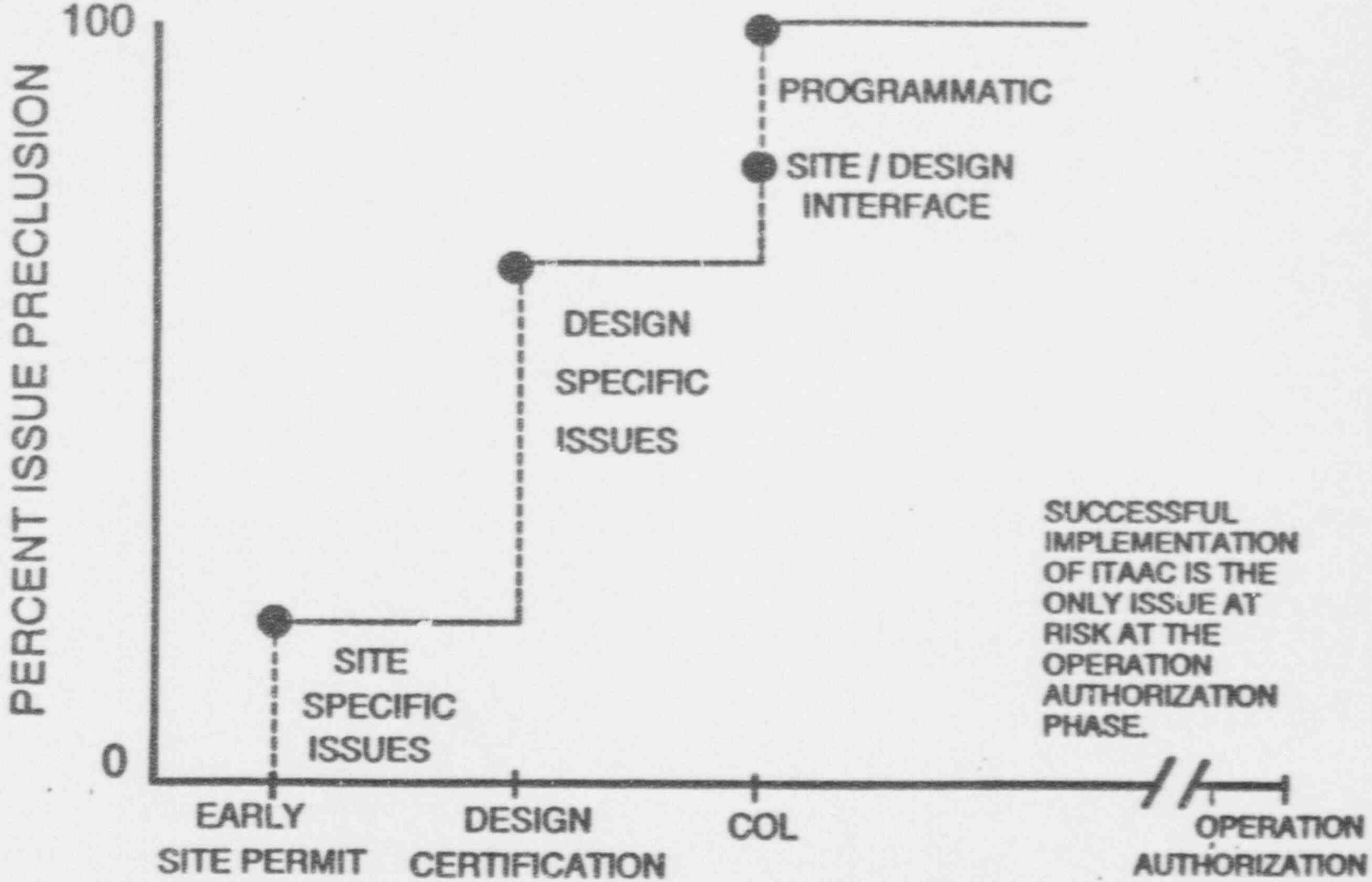


WHAT ARE EXPECTED BENEFITS OF LICENSING UNDER 10 CFR 52?

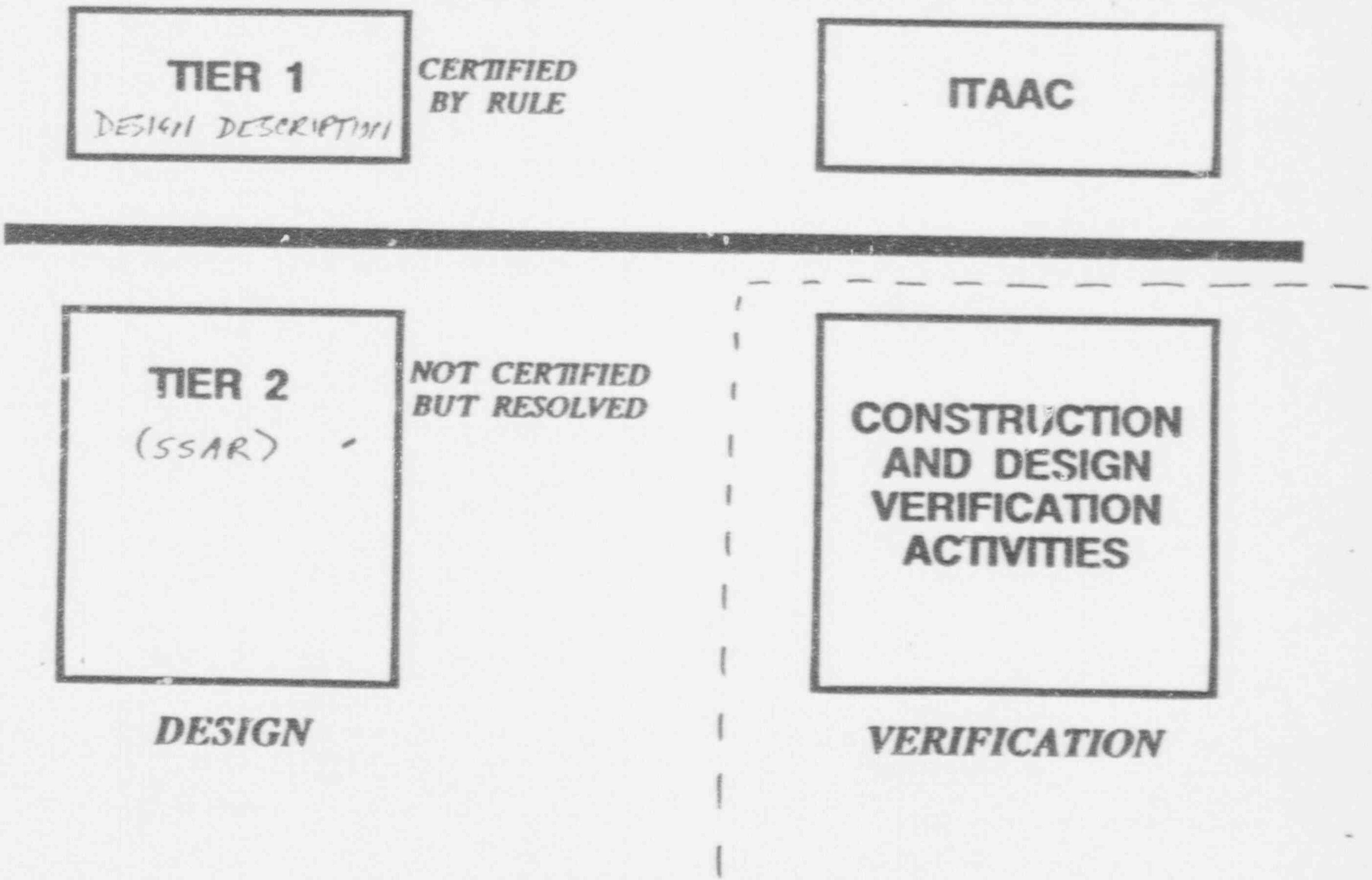
- FINAL SAFETY DECISIONS MADE AT CERTIFICATION STAGE
- DESIGN ESSENTIALLY COMPLETE BEFORE CONSTRUCTION BEGINS AND THERE IS A HIGH THRESHOLD FOR DESIGN CHANGES
- A FEW NUMBER OF STANDARD DESIGNS SHOULD BENEFIT BOTH SAFETY AND OPERATION
- SITE PERMITS CAN BE BANKED FOR LATER USE
- PUBLIC PARTICIPATION OCCURS BEFORE DESIGN COMPLETION AND BEFORE SITE APPROVAL
- SCOPE OF ISSUES THAT CAN BE CHALLENGED AFTER CONSTRUCTION BEGINS IS VERY LIMITED

NRC ACTIVITIES DURING COL REVIEW, CONSTRUCTION, AND OPERATION




PERCENT ISSUE PRECLUSION
100
0
PROGRAMMATIC
SITE / DESIGN
INTERFACE
DESIGN
SPECIFIC
ISSUES
SITE
SPECIFIC
ISSUES
SUCCESSFUL
IMPLEMENTATION
OF ITAAC IS THE
ONLY ISSUE AT
RISK AT THE
OPERATION
AUTHORIZATION
PHASE.
EARLY
SITE PERMIT
DESIGN
CERTIFICATION
COL
OPERATION
AUTHORIZATION

WHAT WILL A DESIGN CERTIFICATION CONTAIN ?



ITAAC

"TIER 1" DESIGN CERTIFICATION MATERIAL CONSISTS OF

- SITE PARAMETERS FOR THE DESIGN
- DESIGN DESCRIPTIONS
- SYSTEMS ITAAC
- GENERIC ITAAC/DAC
- INTERFACE REQUIREMENTS

ITAAC DEFINITION

Inspections, tests, analyses, and acceptance criteria which are necessary and sufficient to provide reasonable assurance that........
a plant which references the design is built and will operate in accordance with the design certification.

ITAAC FOR DESIGN CERTIFICATIONS
TYPES OF ITAAC

- "SYSTEMS ITAAC" FOR SYSTEMS OF DESIGN
- "GENERIC ITAAC" FOR GENERIC CONCERNS ACROSS SYSTEMS CROSS REFERENCED TO SYSTEMS WHERE APPROPRIATE
- EXAMPLES PROVIDED IN SECY FOR STANDBY LIQUID CONTROL SYSTEM AND EQUIPMENT QUALIFICATION ITAAC
- STAFF IS CONSIDERING "COL ITAAC" FOR LICENSEE PROCEDURAL REQUIREMENTS (E.G., TRAINING, ETC.)
- "INTERFACE ITAAC" FOR SITE-SPECIFIC DESIGN (E.G., ULTIMATE HEAT SINK, ETC.)
- "DAC" FOR SELECTED AREAS OF THE DESIGN

ITAAC FOR DESIGN CERTIFICATIONS

RELATIONSHIP OF DESIGN DESCRIPTION TO ITAAC

- DESIGN DESCRIPTION CERTIFIED IN DESIGN CERTIFICATION RULE WILL CONTROL PROPOSED CHANGES TO THE DESIGN BY A FACILITY THAT REFERENCES THE CERTIFIED DESIGN

- ITAAC WILL BE USED FOR FUEL LOAD DECISION AND SUBSEQUENT FACILITY MODIFICATIONS TO THE DESIGN

- STAFF IS EVALUATING WHETHER ALL ELEMENTS OF DESIGN DESCRIPTION REQUIRE A CORRESPONDING ITAAC

- STAFF IS EVALUATING GE PROPOSAL THAT CERTAIN SYSTEMS SHOULD HAVE DESIGN DESCRIPTIONS WITHOUT CORRESPONDING ITAAC, BASED ON SAFETY SIGNIFICANCE OF SYSTEM

ITAAC FOR DESIGN CERTIFICATIONS
TREATMENT OF REGULATORY REQUIREMENTS NOT IN ITAAC

- SOME REQUIREMENTS MET AFTER FUEL LOAD, BUT PRIOR TO OPERATIONS (E.G., START-UP AND INITIAL POWER TESTING)

- THESE ISSUES TREATED AS CONDITIONS OF THE COL; ANALOGOUS TO PLANTS LICENSED UNDER 10 CFR PART 50 WHERE TESTING OCCURED AFTER OL ISSUANCE

- MODIFICATIONS TO THESE PROGRAMS WOULD BE LICENSE AMENDMENTS, PROVIDING OPPORTUNITY FOR PUBLIC COMMENT

ITAAC FOR DESIGN CERTIFICATIONS
TREATMENT OF NON-TRADITIONAL ITEMS

- INSIGHTS FROM PRA AND SEVERE ACCIDENT ISSUE RESOLUTIONS (E.G., SECY-90-016, ETC.) INCORPORATED INTO SSAR

- IMPLICIT CONFIRMATION OF THESE ISSUES SINCE ITAAC VERIFY DESIGN IN SSAR

- STAFF HAS REQUESTED GE TO DEVELOP CROSS REFERENCE OF SSAR ISSUES TO ITAAC; EXAMPLE PROVIDED IN SECY FOR CONTAINMENT PERFORMANCE ANALYSES

DESIGN INFORMATION NOT AVAILABLE AT CERTIFICATION

- AS-BUILT
- AS-PROCURED
- SITE RELATED (INTERFACES)
- EVOLVING TECHNOLOGIES

DAC

- SET OF PRESCRIBED LIMITS, PARAMETERS, ATTRIBUTES
- LIMITED NUMBER OF TECHNICAL AREAS
- ENABLE FINAL SAFETY CONCLUSIONS - VERIFIED THROUGH FUTURE INSPECTIONS
- MEASURABLE, TESTABLE, SUBJECT TO ANALYSIS
- VERIFIED BY ITAAC PROGRAM

DAC AREAS

- PIPING DESIGN
- RADIATION SHIELDING & AIRBORNE CONCENTRATIONS
- CONTROL ROOM DESIGNS
- INSTRUMENTATION AND CONTROLS

VERIFICATION OF DAC/ITAAC

- D(AC) ------> ITA(AC)
- INSPECTION PROGRAM
- FEDERAL REGISTER NOTICES
- COL HOLDER'S RESPONSIBILITY TO MEET AC IN COL

INTERFACES

SCOPE OF ABWR (GE)

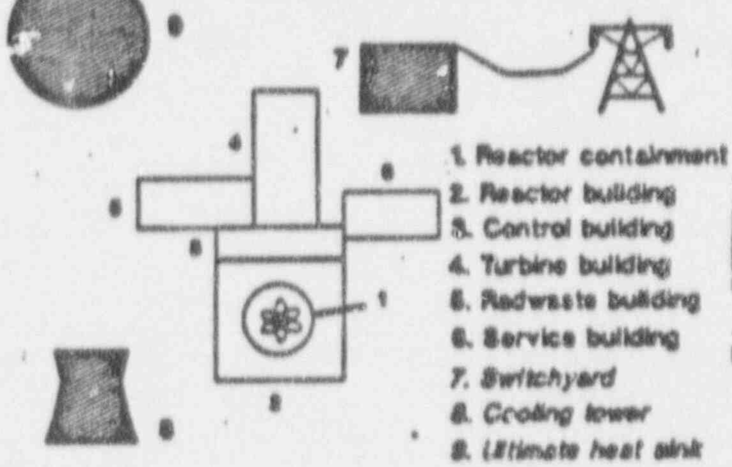


Table 5.0: ABWR Site Parameters

Maximum Ground Water Level: 2 feet below grade

Maximum Flood (or Tsunami) Level(3): 1 foot below grade

Precipitation (for Roof Design):

- Maximum rainfall rate: 19.4 in/hr(5)
- Maximum snow load: 50 lb/sq. ft.

Design Temperatures:

- Ambient
  - 1% Exceedance Values
    - Maximum: 100°F dry bulb/ 77°F coincident wetbulb
    - Minimum: -10°F
  - 0% Exceedance Values (Historical Limit)
    - Maximum: [illegible] dry bulb/ 82°F coincident wet bulb
    - Minimum: -40°F
- Emergency Cooling Water Inlet: 95°F
- Condenser Cooling Water Inlet: ≤100°F

Extreme Wind: Basic Wind Speed: 110 mph(1)/130 mph(2)

Tornado(4):

- Maximum tornado wind speed: 260 mph
- Translational velocity: 57 mph
- Radius: 455 ft
- Maximum atm ΔP: 1.46 psid
- Missile Spectra: Per ANSI/ANS-2.3

Soil Properties:

- Minimum Bearing Capacity (demand): 15ksf
- Minimum Shear Wave Velocity: 1000fps(6)
- Liquification Potential: None at plant site resulting from OBE and SSE.

Seismology:

- OBE Peak Ground Acceleration (PGA): 0.10g(7)(8)
- SSE PGA: 0.30g(9)
- SSE Response Spectra: per applicable regulations
- SSE Time History: Envelope SSE Response Spectra

(1) 50-year recurrence interval; value to be utilized for design of non-safety-related structures only.

(2) 100-year recurrence interval; value to be utilized for design of safety-related structures only

(3) Probable maximum flood level (PMF), as defined in ANSI/ANS-2.8, "Determining Design Basis Flooding at Power Reactor Sites."

(4) 1,000,000-year tornado recurrence interval, with associated parameters based on ANSI/ANS-2.3.

(5) Maximum value for 1 hour 1 sq. mile PMP with ratio 5 minutes to 1 hour PMP as found in National Weather Source Publication HMR No. 52. Maximum short term rate; 6.2in/5 min.

(6) This is the minimum shear wave velocity at low storms after the soil property uncertainties have been applied.

(7) Free-field, at plant grade elevation.

(8) For conservatism, a value of 0.15g is employed to evaluate structural and component responses of the certified design.

(9) Free-field, at plant grade elevation.

Table B.1.b: Safety Analysis Verification Using ITAAC

SSAR Entry	Parameter	Value (1)	Verifying ITAAC
6.2.1	Containment Functional Design		
6.2.1.1.4.1	Vacuum Breakers		
	Diameter (inches)	20	2.14.1 Primary Containment System
	Quantity	8	2.14.1 Primary Containment System
Table 6.2-2	Drywell		
	Volume (ft^3)	2[illegible]9,563	2.14.1 Primary Containment System
	Leak Rate, Drywell and Wetwell (%/Day)	0.5	2.14.1 Primary Containment System
	Wetwell		
	Volume (ft^3)	210,475	2.14.1 Primary Containment System
	Minimum Suppression Pool Water Volume (ft^3)	126,427	2.14.1 Primary Containment System
	Total Vent Area (ft^2)	125	2.14.1 Primary Containment System
	Vent Centerline Submergence (Low Water Level), (ft):		
	Top Row	11.48	2.14.1 Primary Containment System
	Middle Row	15.98	2.14.1 Primary Containment System
	Bottom Row	20.48	2.14.1 Primary Containment System
Table 6.2.2-a	RHR System		
	Pump Capacity (gpm/pump)	4200	2.4.1 Residual Heat Removal System
	Heat Transfer Area (ft^2/unit)		2.4.1 Residual Heat Removal System
	Heat Transfer Coefficient (Btu/sec-F)	195	2.4.1 Residual Heat Removal System
	Service Water Flow (lbm/hr)	2.83×10^6	2.4.1 Residual Heat Removal System
Table 6.2-2d	Secondary Containment		
	Free Volume (ft^3)	3.0×10^6	2.15.10 Reactor Building
	Pressure (inch H_2O)	-0.25	2.15.10 Reactor Building
	Leak Rate (%/day)	50	2.15.10 Reactor Building

6/1/92

ROADMAP ISSUES/KEY ANALYSES

- SEVERE ACCIDENT DESIGN FEATURES (SECY 90-016, 91-078 DESIGN FEATURES?)
- DESIGN BASIS ACCIDENT ANALYSES (CONTAINMENT PERFORMANCE, ETC.)
- PRA INPUTS/ASSUMPTIONS
- "COMMON COMPONENT" SYSTEMS INTERACTIONS

- FLOODING (INTERNAL/EXTERNAL)
- FIRE PROTECTION FEATURES/ANALYSES
- EXTERNAL PHENOMENA
- PIPE BREAKS
- MISSILES
- MOV'S
- TRIP OF ALL RIP'S WITH PRESSURE REGULATOR FAILURE
- ATWS
- S/D RISK
- SBO

ITAAC FOR DESIGN CERTIFICATIONS
BACKGROUND

- REQUIREMENT FOR ITAAC IN 10 CFR 52.47(a)(1)(vi)
- SECY-91-178 DISCUSSED FORM AND CONTENT OF ITAAC
- SECY-91-210 DISCUSSED RELATIONSHIP OF FDA AND ITAAC
- SECY-92-053 DISCUSSED CONCEPT OF DAC
- SECY-92-196 DISCUSSED RAD PROTECTION AND PIPING DAC
- SECY-92-214 DISCUSSED CURRENT STATUS OF ITAAC
- SECY FOR I&C AND HFE DAC EXPECTED TO BE ISSUED THIS MONTH

ITAAC FOR DESIGN CERTIFICATIONS

STATUS OF THE REVIEW

- GE SUBMITTED ITAAC IN 3 STAGES, WITH SENIOR MANAGEMENT MEETINGS HELD EVERY 6-8 WEEKS
- STAGE 1 - NINE "PILOTS" SUBMITTED SEP 91
- STAGE 2 - 40 SYSTEMS SUBMITTED APR 92
- STAGE 3 - FULL ITAAC SUBMITTAL JUN 92

ITAAC FOR DESIGN CERTIFICATIONS

STATUS OF THE REVIEW

- DRAFT FSERS ON CONTROL ROOM AND I&C DACS SUBMITTAL WILL BE PROVIDED IN SECY PAPER TO BE ISSUED IN AUGUST; DRAFT FSERS ON PIPING AND RAD PROTECTION DACS WERE PROVIDED IN SECY-92-196 ISSUED MAY 28, 1992

- COMMENTS ON STAGE 2 SUBMITTAL BEING PROVIDED AS PART OF DRAFT FSER FOR ABWR

- COMMENTS ON STAGE 3 SUBMITTAL WERE PROVIDED IN LETTER OF AUGUST 12, 1992. COMMENTS INCORPORATE STAGE 2 COMMENTS

- "GREYBEARDS" AND REGIONAL REVIEW COMMENTS ON DESIGN CERTIFICATION MATERIAL WERE ALSO PROVIDED AS PART OF STAGE 3 COMMENTS

- NUMARC REVIEW OF ITAAC TBD

- REVIEW GROUP OF NRC REGIONAL/NRR STAFF BEING FORMED

STATUS OF TIER 1 REVIEW
STAGE 3 SUBMITTAL

- STAFF REQUESTED REVISED, QA-CERTIFIED SUBMITTAL BY SEP 30, 1992

- ELECTRICAL ISSUES IN SSAR JUDGED INADEQUATE/UNABLE TO ASSESS TIER 1; 35 PAGES OF COMMENTS ON TIER 2/1

- APPROXIMATELY 23 PAGES OF COMMENTS FROM PLANT SYSTEMS

- APPROXIMATELY 15 PAGES OF COMMENTS FROM ENGINEERING

- GENERIC ITAACS FOR TURBINE BUILDING STATIC SEISMIC ANALYSIS AND NON-SEISMIC/SEISMIC INTERACTION

STATUS OF TIER 1 REVIEW
STAGE 3 SUBMITTAL

- INCONSISTENCIES/QA IN SSAR/DESIGN DESCRIPTION/ITAAC

- GENERIC ITAAC APPLICABILITY TO SYSTEMS UNCLEAR

- ROADMAPS/CROSS REFERENCES TO BE DELIVERED BY GE; SUBMITTED ROADMAPS DIFFICULT TO FOLLOW

- FORMAT OF ITAAC (LOGIC OF DD AND CDC/ITA/AC COLUMNS; USE OF NON-SPECIFIC TERMS; INSPECTION OF DESIGN INSTEAD OF AS-BUILT VERIFICATION; LACK OF TESTING; INCONSISTENT SCOPE OF DESIGN DESCRIPTIONS)

- RECONCILIATION OF ITAAC TO DESIGN BASIS CONDITIONS

STATUS OF TIER 1 REVIEW
GREYBEARDS COMMENTS

- RECOMMENDED 100% REVIEW BY REGIONAL/FIELD PERSONNEL TO ENSURE CLEAR COMMITMENTS AND VERIFICATION RQMTS
- CONCLUDED THAT PROCESS IS WORKABLE; HOWEVER, SUBMITTED MATERIAL IS NOT SUFFICIENT FOR THE STAFF TO MAKE A FINAL SAFETY DECISION
- INCONSISTENT LEVEL OF DETAIL AND CLARITY OF COMMITMENTS
- OVER RELIANCE ON INSPECTIONS VS ACTUAL TESTS
- QA PROBLEMS/INCONSISTENT FORMAT OF COLUMNS
- APPLICABILITY OF GENERIC ITAAC TO SYSTEMS IS UNCLEAR
- NEED FOR "BRIDGE" FROM TIER 1 TO INITIAL TEST PROGRAMS

AUG 25, 1992

STATUS OF TIER 1 REVIEW
REGIONAL COMMENTS

- 7 GENERAL COMMENTS AND 14 PAGES OF COMMENTS ON 10 SYSTEMS

GENERAL COMMENTS:

- DESIGNATIONS OF VALVES AND PUMPS NOT CLEAR IN DRAWINGS
- TESTING OF ALARMS/TRIPS/INTERLOCKS/ETC INADEQUATE
- OVER RELIANCE ON DOCUMENTATION REVIEWS VS ACTUAL TESTS OR INSPECTIONS
- INCONSISTENT LEVEL OF DETAIL/DOES NOT VERIFY ALL KEY PERFORMANCE PARAMETERS
- ENGLISH/METRIC UNITS ARE MIXED AND NOT CONSISTENT
- CROSS REFERENCING OF TIER 1 INFORMATION NOT CLEAR (EX. ITAAC MAY REFER TO SECOND ITAAC, BUT SECOND ITAAC CONTAINS NO COMMITMENTS)
- INTEGRATED SYSTEMS EFFECTS NEEDS REVIEW - (EX. LOSS OF INSTRUMENT AIR EFFECTS ON OTHER SYSTEMS)

2.1.2 Nuclear Boiler System

Design Description

General System Description

The primary functions of the Nuclear Boiler System (NBS) are: (1) to deliver steam from the Reactor Pressure Vessel (RPV) to the Main Steam System (MSS) (2) to deliver feedwater from the Condensate, Feedwater, and Air Extraction System to the RPV, (3) to provide overpressure protection of the Reactor Coolant Pressure Boundary (RCPB), (4) to provide automatic depressurization of the RPV in the event of a Loss of Coolant Accident (LOCA) where the RPV does not depressurize rapidly and the high pressure makeup systems fail to adequately maintain the water level in the RPV, and (5) with the exception of monitoring the neutron flux, to provide the instrumentation necessary to monitor ~~the conditions in the RPV. This includes~~ the RPV pressure, metal temperature, and water level. ~~instrumentation.~~

Figures 2.1.2a and 2.1.2b show the general configuration of the Main Steam Lines (MSLs), the Safety/Relief Valves (SRVs), and the SRV discharge lines. The SRVs perform the dual function of overpressure protection and automatic depressurization of the RPV. Figure 2.1.2c shows the general configuration of the Feedwater (FW) lines.

The MSLs are designed to direct steam from the RPV to the Main Steam System (MSS), the FW lines ARE DESIGNED to direct feedwater from the FW System to the RPV, and the RPV instrumentation ARE DESIGNED to monitor the conditions within the RPV. ~~over the full range of reactor power operation.~~

The NBS contains the valves necessary for isolation of the MSLs, feedwater lines, and their drain lines at the primary containment boundary.

The NBS also contains the RPV head vent line and non-condensable gas removal line.

Main Steam Lines

~~The NBS does not contain all of the MSLs.~~ The NBS contains only the portion of the MSLs from their connection to the Reactor Pressure Vessel (RPV) to the boundary with the MSS, which occurs at the seismic interface located downstream of the outboard Main Steam Isolation Valves (MSIVs).

The main steam lines are Quality Group A from the RPV out to and including the outboard MSIVs, and Quality Group B from the outboard MSIVs to the turbine stop valves. They are Seismic Category I from the reactor pressure vessel out to the seismic interface SHOWN ON FIGURE 2.1.2 b.

~~To support the safety analysis,~~ the total steam volume of the steam lines, from the RPV to the main steam turbine stop valves and turbine bypass valves, ~~shall be~~ is greater than or equal to 113.2 m^3.

MSL Flow Limiter

Each MSL has a flow limiter. The MSL flow limiter consists of a flow restricting venturi which is located in each RPV MSL outlet nozzle. The restrictor limits the coolant blowdown rate from the RPV in the event a MSL break occurs outside the containment to a (choke) flow rate equal to or less than 200% of rated steam flow at 72.1 kg/cm^2 g upstream pressure.

The MSL flow limiter also serves as a flow element to monitor the MSL flow. Instruments lines are provided to monitor the pressure at the throat of the MSL flow limiter. The RPV steam dome pressure instrument lines are used to provide the pressure upstream of the MSL flow limiter.

The MSL flow limiters are designed to limit the loss of coolant from the RPV following a MSL rupture outside the containment to the extent that the RPV water level remains high enough to provide cooling within the time required to close the MSIVs.

~~The MSL flow limiter has no moving parts.~~

Main Steam Isolation Valves

Two isolation valves are welded in a horizontal run of each of the four main steam lines; one valve inside of the drywell, and the other is near the outside of the primary containment pressure boundary.

The MSIVs are Y-pattern globe valves. The main disc or poppet is attached to the lower end of the stem. Normal steam flow tends to close the valve, and higher inlet pressure tends to hold the valve closed. The Y-pattern permits the inlet and outlet passages to be streamlined; this minimizes pressure drop during normal steam flow.

The primary actuation mechanism utilizes a pneumatic cylinder; the speed at which the valve opens and closes can be adjusted. Helical springs around the spring guide shafts will close the valve if gas pressure in the actuating cylinder is reduced.

The MSIV quick-closing speed is ≥ 3 and ≤ 4.5 seconds when N_2 or air pressure is admitted to the upper piston compartment. The valve can be test closed with a 45 to 60 second slow closing speed by admitting N_2 or air to both the upper and low piston compartments.

Feedwater Lines

~~The NBS does not contain all of the FW lines.~~ The NBS contains only the portion of the FW lines from the seismic interface located upstream of the Motor-Operated Valves (MOVs) to their connections to the RPV. Figure 2.1.2c shows the portion of the FW lines within the NBS.

The FW piping consists of two nominal 550 mm ~~(22 inch)~~ diameter lines from the FW supply header. Isolation of each line is accomplished by two containment isolation valves consisting of one check valve inside the drywell and one positive closing check valve outside the containment. Also ~~included~~ in this portion of the line is a manual maintenance valve located between the inboard isolation valve and the reactor nozzle. The feedwater line upstream of the outboard isolation valve contains a remote, manual, Motor-Operated (MO) gate valve, and a seismic interface restraint. The outboard isolation valve and the MO gate valve provide a quality group transitional point in the feedwater lines.

The feedwater piping is Quality Group A from the RPV out to and including the outboard isolation valve, Quality Group B from the outboard isolation valve to and including the MO gate valve, and Quality Group D upstream of the MO gate valve. The feedwater piping and ~~all~~ connected piping of nominal 65 mm ~~(2-1/2-inch)~~ or larger nominal size is Seismic Category I from the RPV to the seismic interface.

Safety/Relief Valves

The nuclear pressure relief system consists of SRVs located on the MSLs between the RPV and the first isolation valve, i.e. the inboard MSIV, within the drywell. These valves protect against overpressurization of the nuclear system.

The rated capacity of the pressure-relieving devices is ~~shall be~~ sufficient to prevent a rise in pressure within the protected vessel of more than 110% of the design pressure ($1.10 \times 87.9\ kg/cm^2g = 96.7\ kg/cm^2g$) for design basis events which cause the RPV pressure to rise.

The SRV discharge line is designed to achieve critical flow conditions through the valve, thus providing flow independence to discharge pipe losses. Each SRV has its own discharge line. The SRV discharge lines terminate at the quenchers located below the surface of the suppression pool.

The SRVs provide three main protection functions:

(1) Overpressure safety operation: The valves function as safety valves and open to prevent nuclear system overpressurization—they are self-actuating by inlet steam pressure if not already signaled open for relief operation.

The safety (steam pressure) mode of operation is initiated when direct and increasing static inlet steam pressure overcomes the restraining spring and frictional forces acting against the inlet steam pressure at the main disc or pilot disc and the main disc moves in the opening direction. The condition at which this action is initiated corresponds to the set-pressure value (Table 2.1.2a) stamped on the nameplate of the SRV.

(2) Overpressure relief operation: The valves are opened using a pneumatic actuator upon receipt of an automatic or manually initiated signal to reduce pressure or to limit pressure rise.

The relief (power actuated) mode of operation is initiated when an electrical signal is received at any of the solenoid valves located on the pneumatic actuator assembly. The solenoid valve(s) ~~will~~ open, allowing pressurized air to enter the lower side of the pneumatic cylinder which pushes the piston and the rod upwards. This action pulls the lifting mechanism of the main or pilot disc thereby opening the valve to allow steam to discharge through the SRV until the inlet pressure is near or equal to zero.

For overpressure relief valve operation (power-actuated mode), pressure sensors on the RPV generate a RPV high pressure trip signal which is used to initiate opening the SRVs. When the set pressure is reached, the SRV power-actuated relief solenoid is energized, which admits pneumatic pressure to the SRV actuator, thereby opening the SRV.

The SRV pneumatic operator is so arranged that, if it malfunctions, it will not prevent the SRV from opening when steam inlet pressure reaches the spring lift setpoint.

(3) Depressurization operation: The Automatic Depressurization System (ADS) valves open automatically as part of the Emergency Core Cooling System (ECCS) for events involving small breaks in the nuclear system process barrier.

Eight of the eighteen SRVs are designated as ADS valves and are capable of operating from either ADS logic or safety/relief logic signals.

Automatic depressurization by the ADS is provided to reduce the reactor pressure during a LOCA in which the High Pressure Core Flooder (HPCF) System and/or the Reactor Core Isolation Cooling (RCIC) System are unable to restore water level. This allows makeup of core cooling water by the low pressure makeup system, the Low Pressure Flooder (LPFL) Mode of the Residual Heat Removal (RHR) System.

The ADS consists of redundant trip channels arranged in two separated logics that control two separate solenoid-operated gas pilots, ADS 1 and ADS 2, on each ADS SRV. Either pilot can operate the ADS valve. These pilots control the pneumatic pressure applied by the accumulators and the High Pressure Nitrogen Gas Supply (HPIN) System. The power for instrumentation and logic is obtained from the Safety System Logic and Control (SSLC) Division I and II.

Sensors from all four divisions and Division I control logic for low reactor water level and high drywell pressure initiate ADS 1 pilots, and sensors from all four divisions and Division II initiate ADS 2 pilots, either of which will initiate the opening of the ADS SRVs.

The reactor vessel low water level initiation setting for ADS is preselected to depressurize the reactor vessel in time to allow adequate cooling of the fuel by the network of ECCS following a LOCA. Timely depressurization of the reactor vessel is provided if the reactor water level drops below preset limits together with an indication that high drywell pressure has occurred, which signifies there is a loss of coolant into the containment with insufficient high pressure makeup to maintain reactor water level. For breaks outside the containment, timely depressurization of the reactor vessel is provided if the reactor water level drops below preset limits for a time period sufficient for the ADS high drywell pressure bypass timer and the ADS timer to time-out.

All SRVs have individual non-safety related accumulators. In addition, those with ADS function have a separate safety-related larger capacity accumulators with separate redundant gas power actuators.

The ADS accumulators are sized to operate the SRV two times with the drywell pressure at 70% of design gauge pressure following failure of the pneumatic supply to the accumulator.

The SRVs can be operated individually in the power-actuated mode by remote manual switches located in the main control room.

NBS Instrumentation

The purpose of the NBS RPV instrumentation is to monitor and provide control input ~~for operation variables~~ during plant operation.

The NBS contains the instrumentation for monitoring the reactor pressure, metal temperature, and water level. The reactor pressure and water level instruments are used by multiple Boiling Water Reactor (BWR) systems, both safety-related and non-safety related.

Pressure indicators and transmitters detect reactor vessel internal pressure from the same instrument lines used for measuring reactor vessel water level.

The RPV coolant temperatures are determined by measuring saturation pressure (which gives the saturation temperature), outlet flow temperature to the Reactor Water Cleanup (CUW), and the RPV bottom head drain line temperature. The reactor vessel outside surface (metal) temperatures ~~is~~ ARE measured at the head flange and the bottom head locations. Temperatures needed for operation and for operating limits are obtained from these measurements. During ~~normal~~ PLANT operation, either reactor steam saturation temperature and/or inlet temperatures of the reactor coolant to the CUW System and the RPV bottom head drain can be used determine the RPV coolant temperature.

Figure 2.1.2e shows the water level and RPV penetrations for each water level range. The instruments that sense the water level are ~~all~~ differential pressure devices calibrated for a specific RPV pressure (and corresponding liquid temperature) conditions. The water level measurement design is the condensate reference chamber type. Instrument zero for ~~all~~ the RPV water level ranges is the top of the active fuel. The following is a description of each water level range shown on Figure 2.1.2e.

(1) Shutdown Range Water Level.

This range is used to monitor the reactor water level during shutdown condition when the reactor system is flooded for maintenance and head removal. The two RPV instrument penetrations elevations used for this water level measurement are located at the top of the RPV head and the instrument tap just below the dryer skirt.

(2) Narrow Range Water Level.

This range is used to monitor reactor water level during ~~normal~~ PLANT power operation. This range uses the RPV taps at the elevations near the top of the steam outlet nozzles and the taps at the elevation near the bottom of the dryer skirt. The Feedwater Control (FDWC) System uses this range for its water level control and indication inputs.

(3) Wide Range Water Level.

This range is used to monitor reactor water level for events where the water level exceeds the range of the narrow range water level instrumentation, and is used to generate the low reactor water level trip signals which indicate a potential LOCA. This range uses the RPV taps at the elevations near the top of the steam outlet nozzles and the tap below the Top of the Active Fuel (TAF).

(4) Fuel Zone Range Water Level.

This range is provided for the post accident monitoring, and provides the capability to monitor the reactor water level below the wide range water level instrumentation. This range uses the RPV taps at the elevations near the top of the steam outlet nozzles and the taps below the TAF (above pump deck).

The NBS contains ~~the~~ instrument lines to monitor the differential pressure across the RPV pump deck and core support plate. The instrumentation which actually performs these functions is located within the Recirculation Flow Control (RFC) System.

The SRVs are provided with position sensors which provide positive indication of SRV disk/stem position.

Thermocouples are located in the discharge exhaust pipe of the SRVs. The temperature signal goes to a multipoint recorder with an alarm and ~~will be~~ activated by any temperature in excess of a set temperature signaling that one of the SRV seats has started to leak.

The NBS also contains the drywell pressure instrumentation used to generate the safety-related high drywell pressure trip LOCA signal~~, which is used by many of the safety related systems to initiate safety actions~~. The Reactor Protection System (RPS) utilizes this signal as a scram initiation signal. The Leak Detection and Isolation System (LDS) utilizes this signal to initiate containment isolation. The Emergency Core Cooling Systems (ECCSs) utilizes this signal as a system initiation signal.

Control room indication and/or alarms are provided for the ~~important~~ plant parameters monitored by the NBS ~~.~~ THAT ARE DISCUSSED ABOVE.

ASME Code Requirements

The major mechanical components are designed to meet American Society of Mechanical Engineers (ASME) Code Requirements as shown below:

Component	ASME Code Class	Design Conditions Pressure	Design Conditions Temperature
FW lines from the MOVs to the outboard containment isolation check valves	2	87.9 kg/cm^{2}g ~~(1250 psig)~~	302°C ~~(575°F)~~
FW lines from the outboard containment isolation check valve to the RPV	1	87.9 kg/cm^{2}g ~~(1250 psig)~~	302°C ~~(575°F)~~
~~Feedwater (~~FW~~)~~ line outboard containment isolation check valve	1	87.9 kg/cm^{2}g ~~(1250 psig)~~	302°C ~~(575°F)~~
Main Steam Isolation Valves (MSIVs)	1	96.7 kg/cm^{2}g ~~(1375 psig)~~	308°C ~~(586.°F)~~
Safety/Relief Valves (SRVs)	1	96.7 kg/cm^{2}g ~~(1375 psig)~~	308°C ~~(586.°F)~~
Main Steam Lines (MSLs), from Reactor Pressure Vessel (RPV) to outboard MSIVs	1	87.9 kg/cm^{2}g ~~(1250 psig)~~	302°C ~~(575°F)~~
MSLs from the outboard MSIVs to the seismic interface restraint	2	87.9 kg/cm^{2}g ~~(1250 psig)~~	302°C ~~(575°F)~~
SRV discharge line piping, from the SRVs to the diaphragm floor	3	38.0 kg/cm^{2}g ~~(540 psig)~~	250°C ~~(482°F)~~
SRV discharge line piping, from the diaphragm floor to the suppression pool surface	2	38.0 kg/cm^{2}g ~~(540 psig)~~	250°C ~~(482°F)~~

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.1.2b provides a definition of the inspections, tests and/or analyses together with associated acceptance criteria which will be undertaken for the NBS.

Table 2.1.2a: Nuclear System Safety/Relief Valve Setpoints

Set Pressures and Capacities

Number* of Valves	Spring Set Pressure (kg/cm^2g)	ASME Rated Capacity at 103% Spring Set Pressure (kg/hr each)
1	80.8	395,000
1	80.8	395,000
4	81.5	399,000
4	82.2	402,000
4	82.9	406,000
4	83.6	409,000

*. Eight of the SRVs serve in the automatic depressurization function.

Table 2.1.2b: Nuclear Boiler System

Inspections, Tests, Analyses and Acceptance Criteria

SEE PAGE 13a.

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A simplified configuration of the Main Steam Lines (MSLs), and Feedwater (FW) lines within the Nuclear Boiler System (NBS) scope, and the Safety/Relief Valves (SRVs) and the Safety/Relief Valve (SRV) discharge lines, as described in Section 2.1.2 and shown in Figures 2.1.2a, 2.1.2b, and 2.1.2c.	1. Visual field inspection will be conducted to confirm that the installed equipment is in compliance with the design configuration defined in Figures 2.1.2a, 2.1.2b, and 2.1.2c.	1. The system configuration is in accordance with Figures 2.1.2a, 2.1.2b, and 2.1.2c.
2. The Reactor Coolant Pressure Boundary (RCPB) portions of the NBS are classified as American Society of Mechanical Engineers (ASME) Code Class 1. They are designed, fabricated, examined and hydrotested per the rules of the ASME Code, Section III. This includes the MSLs from the Reactor Pressure Vessel (RPV) to and including the outboard Main Steam Isolation Valves (MSIVs), the FW lines from the outboard positive closing check valves to the RPV.	2. Inspections will be conducted of ASME Code required documents and the Code stamp on the actual components to verify that they have been manufactured per the relevant ASME requirements.	2. The components have appropriate ASME Code, Section III, Class 1 certifications and Code Stamps.
3. Each Main Steam Line (MSL) ~~shall have~~ HAS a flow limiter located in the RPV MSL outlet nozzle. The MSL flow limiter ~~shall~~ limitS the coolant blowdown rate from the RPV in the event of a MSL break to a (choke) flow rate equal to, or less than 200% of rated steam flow at 72.1 kg/cm^{2}g upstream pressure.	3. Using the as-built dimensions, perform an analysis which shows that the MSL flow limiters satisfy the ~~requirement.~~ CERTIFIED DESIGN COMMITMENT.	3. ~~Analysis confirms that~~ the MSL flow limiters ~~perform their intended function.~~ WILL LIMIT THE COOLANT BLOWDOWN RATE FROM THE RPV TO A CHOK FLOW RATE EQUAL TO, OR LESS THAN, 200% OF RATED STEAM FLOW AT 72.1 Kg/cm^{2}g UPSTREAM PRESSURE.
4. Each MSL flow limiter has taps for two instrument lines. These instrument lines are used for monitoring the flow through each MSL.	4. Visual inspection will be conducted to REVIEW ~~confirm that~~ the MSL instrument lines ~~have been installed in compliance with design commitment.~~	4. ~~Inspection confirm that~~ the MSL flow instrument lines have been installed.

Table 2.1.2b: Nuclear Boiler System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The total steam line volume from the RPV to the main steam turbine stop valves and steam bypass valves ~~shall be~~ IS greater than or equal to 113.2 m^3.	5. Using the as-BUILT ~~designed~~ configuration of the steam lines perform calculations to determine the main steam line volume.	5. ~~Calculations confirm that~~ the steam line volume ~~satisfies the design requirement.~~ IS GREATER THAN OR EQUAL TO 113.2 m^3.
6. ~~The MSIVs meet the requirements of ASME Code, Section III.~~	6. ~~Inspections will be conducted of ASME Code required documents and the Code Stamp on the actual components to verify that they have been manufactured per the relevant ASME requirements.~~	6. ~~The MSIVs have appropriate ASME Code, Section III, Class 1 certifications and code stamps.~~
7. The Main Steam Isolation Valve (MSIV) closing time shall be between 3 and 4.5 seconds when N_2 or air is admitted into the valve pneumatic actuator.	7. Pre-operational tests will be conducted to demonstrate proper operation of the MSIVs, including verification of the closure time.	7. Pre-operational tests confirms that the MSIVs satisfy the closure time requirement.
8. ~~The SRVs meet the requirements of ASME Code, Section III.~~	8. ~~Inspections will be conducted of ASME Code required documents and the Code Stamp on the actual components to verify that they have been manufactured per the relevant ASME requirements.~~	8. ~~The SRV have appropriate ASME Code, Section III, Class 1 certifications and code stamps.~~
9. There ARE ~~shall be~~ 18 SRVs mounted on the MSLs as shown in Figure 2.1.2a. The required spring set pressure and capacities are given in Table 2.1.2a. The SRVs ~~shall~~ meet the opening performance shown in Figure 2.1.2f.	9. Inspections will be conducted to confirm that the SRVs have the required (nominal) spring set pressure and (minimum) capacity on the SRV nameplate. Visual inspections will be conducted ~~to confirm that all 18 SRVs have been installed in their proper locations.~~ TO REVIEW THE AS-BUILT SRVS. Review of the qualification test data for the particular SRV model selected ~~to confirm that the opening performance complies with the requirements.~~	9. ~~Inspections confirm that~~ the SRVs have the ~~required~~ capacities and set pressures ~~identifie~~ [illegible] ~~ir name plates.~~ SHOWN ON TA[illegible] 2a. Inspections confirm that the ~~proper capacity and set pressure SRV has been mounted in its correct location.~~ ALL 18 SRVS WERE INSTALLED. ~~Confirm that~~ the selected SRV model satisfies the performance requirements ~~.~~ OF FIGURE 2.1.2f.

Table 2.1.2b: Nuclear Boiler System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. The SRVs ~~shall be~~ ARE provided with instrumentation which will provide positive indication (i.e. by direct measurement) of SRV position.	10. VISUAL Inspection will be performed ~~that~~ ON the SRVs ~~have positive~~ position indication instrumentation~~, and that the instrumentation has been properly connected~~.	10. ~~Inspection confirms that~~ the SRVs have positive position indication.
11. A simplified configuration of the Automatic Depressurization System (ADS) SRVs and the non-ADS SRVs ~~as~~ described in Section 2.1.2 and Figure 2.1.2.d. There are 8 ADS SRVs and 18 non-ADS SRVs.	11. Visual field inspection will be conducted to confirm that the installed equipment is in compliance with Figure 2.1.2d.	11. The configuration ~~is in~~ accordance with Figure ~~2.1.2d~~.
12. Upon receipt of either a high drywall pressure trip signal current with a RPV low water ~~level 1~~ trip signal of ~~sufficient duration~~ for the ADS timer to time-out, or a RPV low water ~~level 1~~ trip signal of ~~sufficient duration~~ for the ADS high drywell pressure bypass timer and the ADS timer to time-out, the ADS logic generates a ADS initiation signal to the SRV ADS solenoids.	12. Logic and instrument functional testing shall be performed to demonstrate that the ADS logic performs ~~as required~~.	12. The drywell pressure and RPV water level instrumentation, as well as the ADS logic, functions ~~as required to~~ generate the ADS initiation signals UPON RECEIPT OF SIGNALS DESCRIBED IN CERTIFIED DESIGN COMMITMENT.
13. The SRV discharge lines ~~shall~~ terminate at the quenchers located below the surface of the suppression pool.	13. Visual inspections will BE PERFORMED TO REVIEW ~~confirm that~~ the SRV discharge line quenchers ~~have been installed~~.	13. ~~Inspection confirms that~~ the SRV discharge line quenchers have been installed AND ~~as~~ ARE LOCATED BELOW THE SURFACE OF THE SUPPRESSION POOL.
14. The RPV ~~shall be~~ IS provided with instrument lines and instrumentation ~~necessary~~ to monitor the RPV steam dome pressure and the RPV water level from the Bottom of the Active Fuel (BAF) to top of the steam dome.	14. Visual REVIEW inspections will be performed to ~~confirm that~~ the instrument lines and instrumentation for the RPV steam dome pressure, the RPV shutdown range water level, the RPV narrow range water level, the RPV wide range water level, and the RPV fuel zone range water level sensors ~~has been properly installed~~.	14. ~~Inspection confirms that~~ the instrumentation has been properly installed FOR THE RPV STEAM DOME PRESSURE, THE RPV SHUTDOWN RANGE WATER LEVEL, THE RPV NARROW RANGE WATER LEVEL, THE RPV WIDE RANGE WATER LEVEL, AND THE RPV FUEL ZONE WATER LEVEL SENSORS
15. For the safety related NBS instrumentation, the instrumentation be capable of performing its necessary function.	15. Instrument functional testing shall be performed to demonstrate that the instrumentation performs as required.	~~15. The instrumentation functions as required.~~

Table 2.1.2b: Nuclear Boiler System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
16. Control room indication/alarms are provided for the important plant parameters monitored by the NBS.	16. Inspection shall be performed which confirms that the important plant parameters monitored by the NBS are indicated and/or alarmed in the main control room.	16. Inspection confirms that the important plant parameters have been indicated and/or alarmed in the main control room.

2.1.2

TABLE 2.1.2 b

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A simplified configuration for the NBS System is described in Section 2.1.2.	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the NBS System.	1. The as-built configuration of the NBS System is in accordance with the description in Section 2.1.2.
2. Portions of the NBS System are classified as ASME Code class as indicated in Section 2.1.2. They are designed, fabricated, installed, and inspected in accordance with the ASME Code, Section III.	2. ASME Code Data Reports will be reviewed and inspections of Code stamps will be conducted for ASME components in the NBS System.	2. Those portions of the NBS System identified as ASME Code class in Section 2.1.2 have ASME Code Section III, Code Data Reports and Code stamps (or alternative markings permitted by the Code).
3. The ASME portions of the NBS System retain their integrity under internal pressures that will be experienced during service.	3. A hydrostatic test of the ASME portions of the NBS System will be conducted.	3. The results of the hydrostatic test of the ASME portions of the NBS System conform with the requirements in the ASME Code, Section III.
6. Control room indicators are provided for NBS System parameters defined in Section 2.1.2.	6. Inspections will be performed to verify the presence of control room indicators for the 2.1.2 System.	6. Instrumentation is present in the Control room as defined in Section 2.1.2.
~~The ______ System operates when powered from either normal off-site or emergency on-site sources.~~	~~______ System functional tests shall be performed to demonstrate operation when supplied by either normal off-site power or the emergency diesel generator(s).~~	~~______ System operates when supplied by either normal off-site sources or the emergency diesel generators.~~

13a

TABLE:ITAAC10

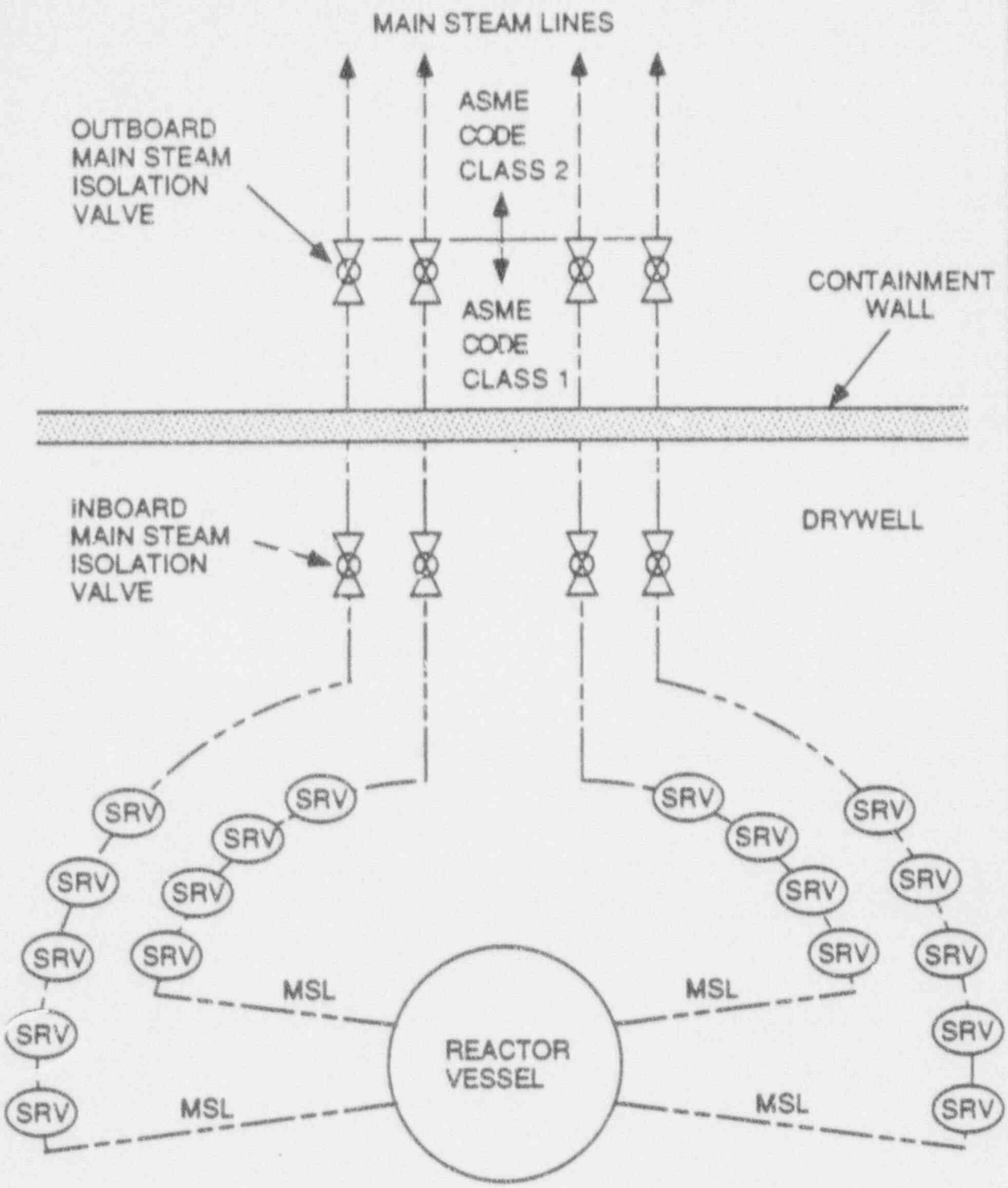


Figure 2.1.2a Safety/Relief Valves and Steamline

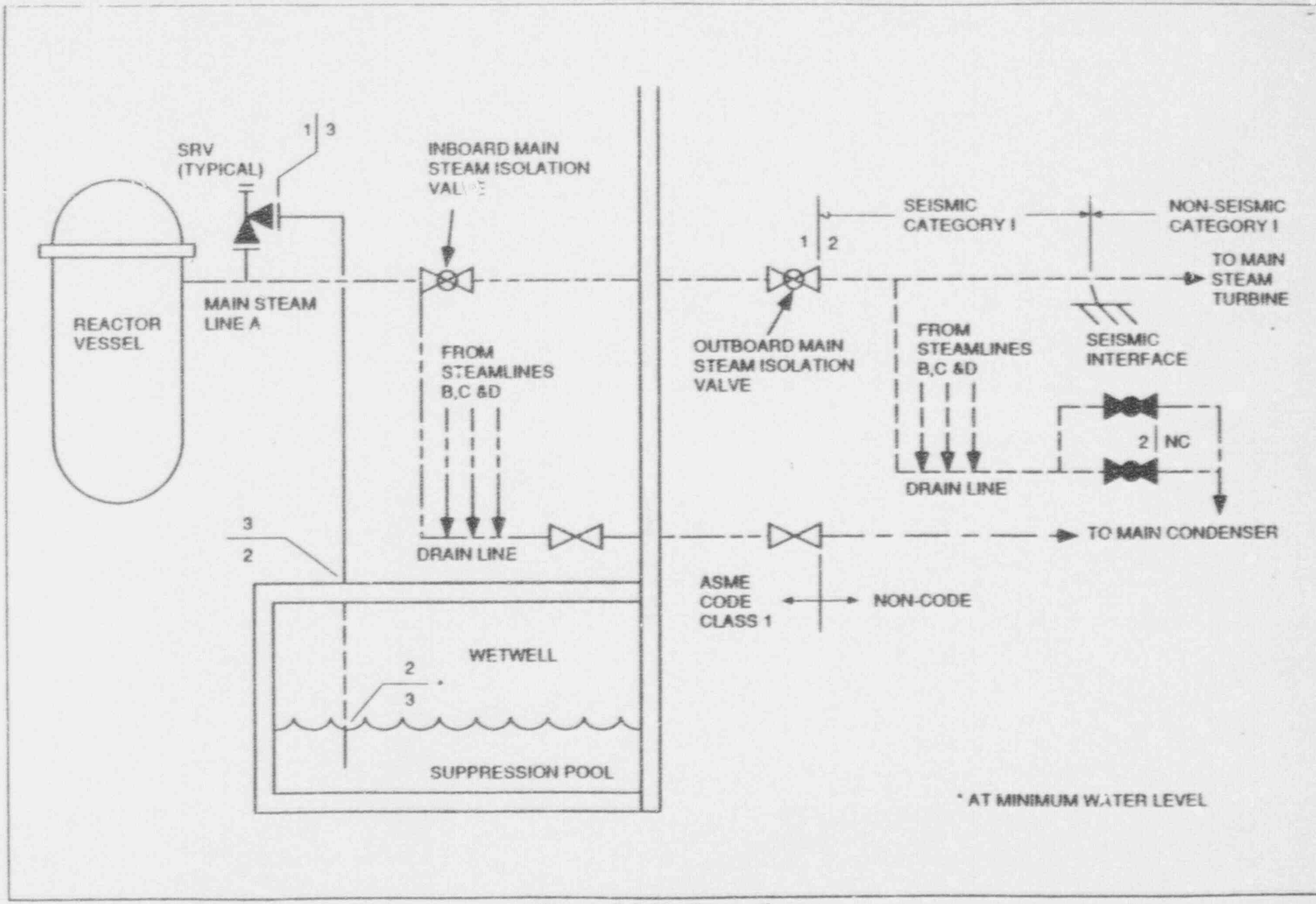


Figure 2.1.2b Steamline

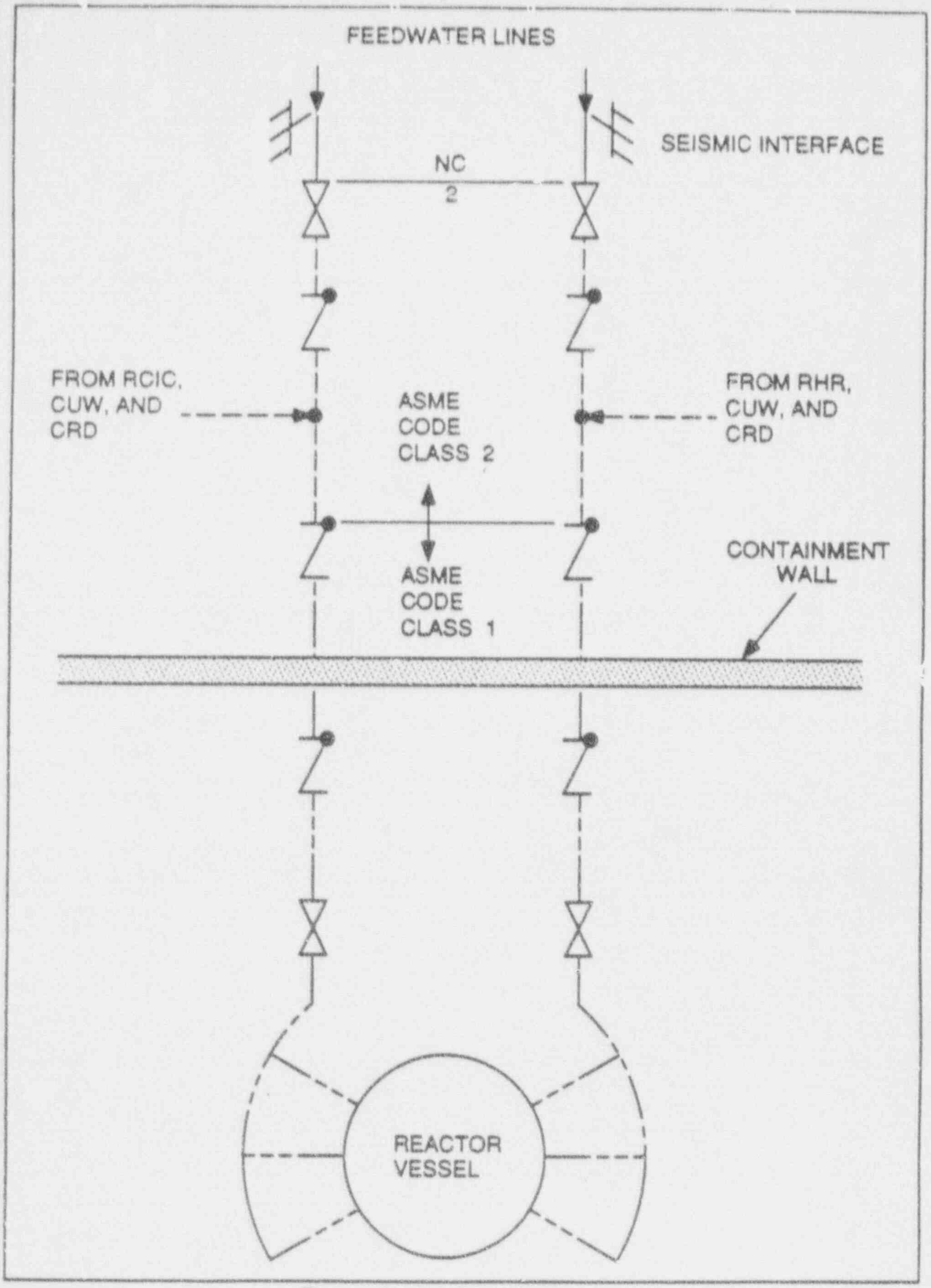


Figure 2.1.2c Feedwater Line

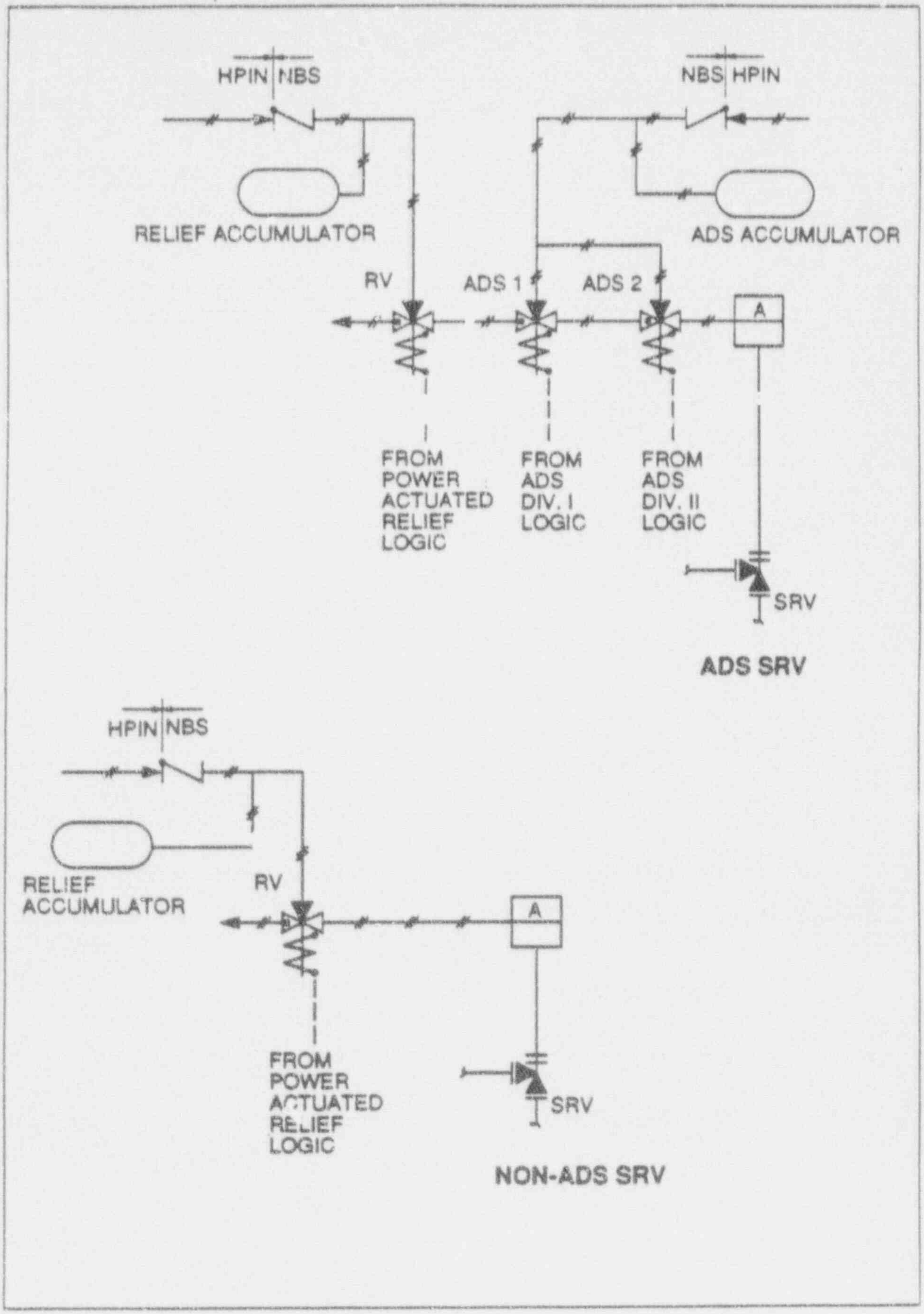


Figure 2.1.2d Safety/Relief Valve Pneumatic Lines

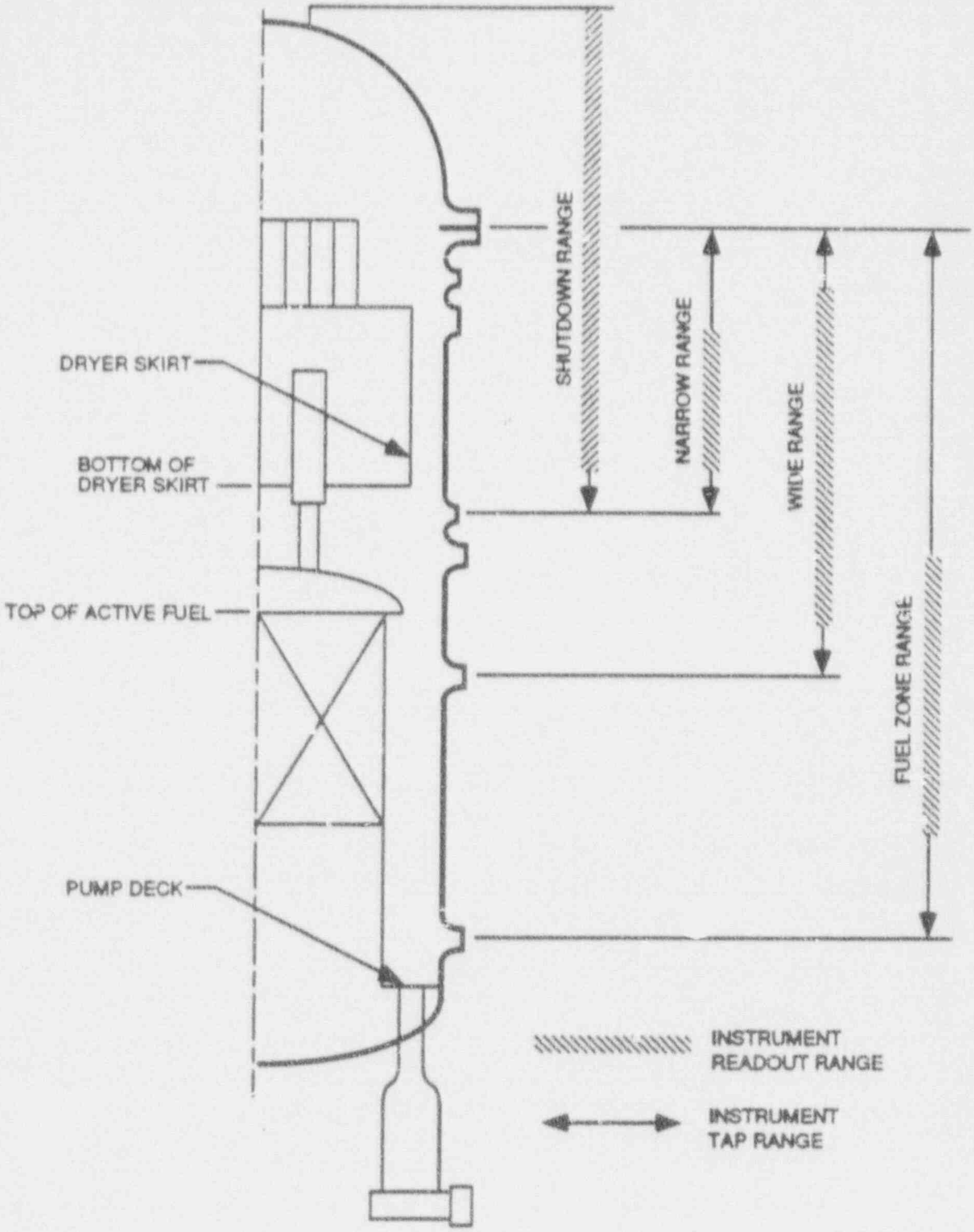


Figure 2.1.2e Water Level Range Definition

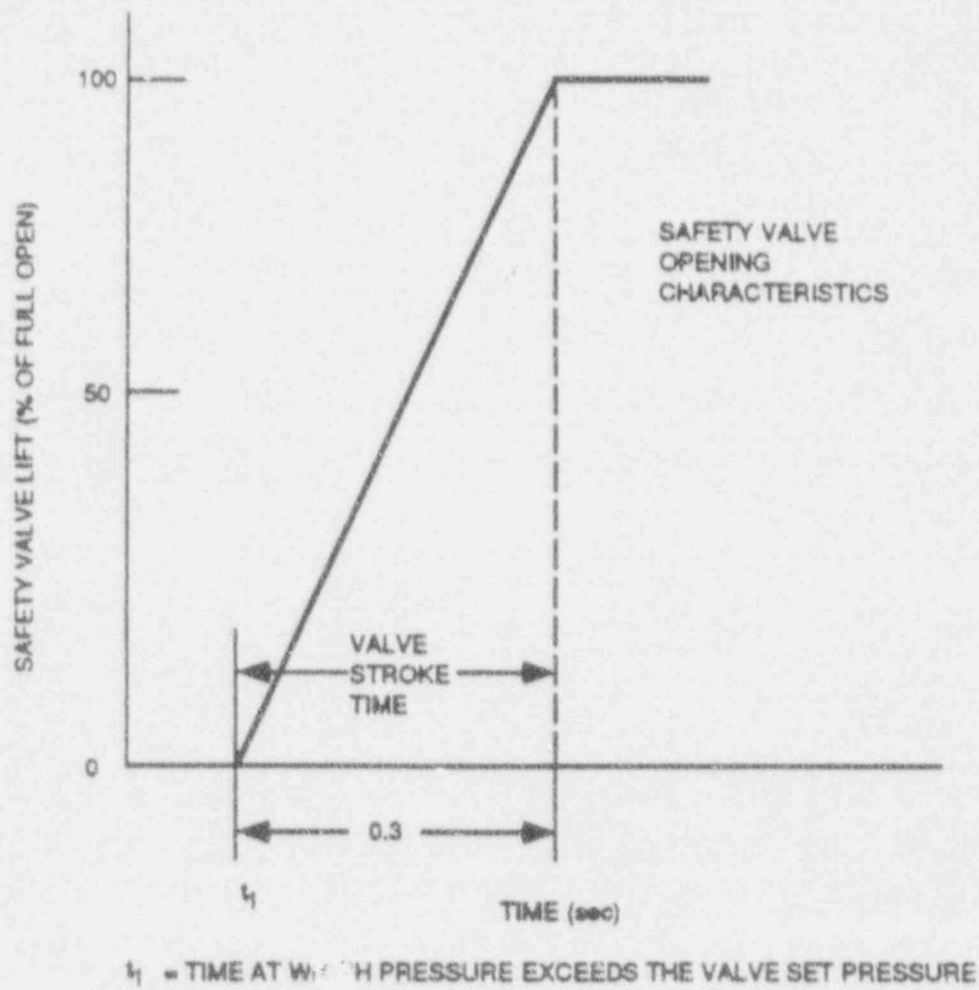


Figure 2.1.2f Safety-Action Valve Lift Characteristics

2.11.13 High Pressure Nitrogen Gas Supply System

Design Description

The High Pressure Nitrogen Gas Supply (HPIN) System is designed to provide nitrogen gas to pneumatic equipment inside primary containment. The HPIN System consists of two independent subsystems, one being safety-related and the other non-safety-related. The non-safety-related portion receives its nitrogen gas source from the Atmospheric Control (AC) System and distributes it inside containment for the following equipment:

(1) relief function accumulators of main steam safety/relief valves.

(2) nitrogen operated valves and instruments inside containment.

(3) leak detection system radiation monitor calibration.

(4) Automatic Depressurization System (ADS) function accumulators of the main steam safety/relief valves to compensate leakage during normal operation.

Following a LOCA, nitrogen supply to the ADS function accumulators are supplied by the safety-related HPIN subsystem. The safety-related subsystem consists of two redundant divisions supplied from high pressure nitrogen gas storage bottles. Each division is mechanically and electrically separated from the other. One division supplies nitrogen to half of the ADS designated safety/relief valves and the other division for the remaining half. The nitrogen storage bottles supply valve is normally closed with key lock control switch normally in "auto" mode. Remote manual closure and opening can only be accomplished with the key. The supply valve automatically opens in response to low pressure condition in the ADS accumulator supply line. During this emergency mode of operation, power to the safety-related HPIN subsystem is automatically switched to divisional emergency AC power sources.

Separations between the safety-related and the non-safety-related portions of the HPIN System are provided by motor operated shutoff valves that automatically close on low pressure condition in the ADS and non-ADS SRV accumulator supply lines.

The non-safety-related portion is designed to non-seismic class, Quality Group D, while the safety-related portion is Safety Class 3, Seismic Category I, Quality Group C, Electrical Class 1E. The shutoff valves separating safety-related from the non-safety-related portions are Seismic Category I, Quality Group C design. All primary containment penetrations meet Seismic Category I, Quality Group B design requirements.

HIGH PRESSURE GAS SUPPLY SYSTEM

Table 2.11.13: ~~Remote Shutdown System~~

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. ~~The configuration of the HPIN System is shown in Figure 2.11.13.~~ *SEE PAGE 3a*	1. ~~Inspection of the as-built HPIN System configuration shall be performed.~~	1. ~~Verification of the as-built conformance with the as-designed configuration (Figure 2.11.13).~~
2. The nitrogen gas bottles supply valve automatically opens on low pressure *signal* and automatically closes on high pressure *signal* conditions at the ADS accumulator supply line.	2. Using simulated high and low pressure signals, functional testing of the system logic shall be performed ~~to demonstrate automatic opening and closing capability of the nitrogen gas bottles supply valve~~ with the control switch in "auto" mode.	2. Automatic opening and closing of the nitrogen gas bottles supply valves *ON LOW AND HIGH PRESSURE SIGNAL AT THE ADS ACCUMULATOR SUPPLY LINE.*
3. The nitrogen gas bottles supply valve ~~remote manual operability.~~ *CAN BE OPENED AND CLOSED REMOTELY AND MANUALLY WITH KEY.*	3. Demonstrate remote manual actuation of the nitrogen gas bottles supply valve from the main control room with key.	3. *NITROGEN GAS BOTTLE SUPPLY VALVE IS* ~~Remote manual open/close actuation~~ *OPENED AND CLOSED* from the main control room with key. ~~No valve actuation when key is not used.~~
4. The safety-to-non-safety related interface shutoff valves automatically close on low pressure *SIGNAL* ~~condition~~ on the ADS and non-ADS accumulator supply lines.	4. Functional testing utilizing simulated ~~signals shall be performed to demonstrate auto closure of the safety-to-non-safety interface shutoff valves on~~ low pressure *SIGNAL* ~~condition~~ at the ADS and non-ADS accumulator supply lines.	4. Auto closure of the safety-to-non-safety interface shutoff valves.
5. The safety-related portion of HPIN System automatically switches power to *AND OPERATES ON* emergency AC on loss of normal power supply.	5. *PERFORM TESTS TO* ~~Demonstrate~~ automatic power switching and HPIN System ~~operability when~~ *OPERATES ON* ~~supplied from the~~ emergency AC sources.	5. HPIN System *AUTOMATICALLY SWITCHED TO* ~~power switching and HPIN System operability~~ *AND OPERATES* on emergency AC sources.
6. HPIN outboard containment isolation valves ~~remote manual closure capability.~~ *CAN BE OPENED AND CLOSED REMOTELY AND MANUALLY*	6. Demonstrate remote manual *ACTUATION* ~~closure capability~~ of the HPIN outboard containment isolation valves from the main control room.	6. *HPIN OUTBOARD CONTAINMENT ISOLATION* ~~Valves remote manual closure~~ *VALVES ARE OPENED AND CLOSED* from the main control room.
7. ~~Provision for control room alarms, and indications vital for HPIN operation.~~	7. ~~Inspection shall be performed to verify presence of control room alarms and indications~~	7. ~~The control room alarms and indications specified in Section 2.11.13.~~

2.11.13

TABLE 2.11.13

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A simplified configuration for the HPIN System is described in Section 2.11.13.	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the HPIN System.	1. The as-built configuration of the HPIN System is in accordance with the description in Section 2.11.13.
8. Portions of the HPIN System are classified as ASME Code class as indicated in Section 2.11.13. They are designed, fabricated, installed, and inspected in accordance with the ASME Code, Section III.	8. ASME Code Data Reports will be reviewed and inspections of Code stamps will be conducted for ASME components in the HPIN System.	8. Those portions of the HPIN System identified as ASME Code class in Section 2.11.13 have ASME Code Section III, Code Data Reports and Code stamps (or alternative markings permitted by the Code).
9. The ASME portions of the HPIN System retain their integrity under internal pressures that will be experienced during service.	9. A hydrostatic test of the ASME portions of the HPIN System will be conducted.	9. The results of the hydrostatic test of the ASME portions of the HPIN System conform with the requirements in the ASME Code, Section III.
7. Control room indicators are provided for HPIN System parameters def[illegible]d in Section 2.11.13.	7. Inspections will be performed to verify the presence of control room indicators for the HPIN System.	7. Instrumentation is present in the Control room as defined in Section 2.11.13.
The ____________ System operates when powered from either normal off-site or emergency on-site sources.	____________ System functional tests shall be performed to demonstrate operation when supplied by either normal off-site power or the emergency diesel generator(s).	____________ System operates when supplied by either normal off-site sources or the emergency diesel generators.

3a

HIGH PRESSURE NITROGEN GAS SUPPLY SYSTEM

2.11.13

KEY SYSTEM FUNCTIONS:

SAFETY AND NON-SAFETY USERS AND PART OF CONTAINMENT BOUNDARY

IMPORTANT ELEMENTS OF DESIGN:

SAFETY PORTION HAS TWO TRAINS USING NITROGEN BOTTLES AND SUPPLIES NITROGEN TO AUTOMATIC DEPRESSURIZATION SYSTEM (ADS) ACCUMULATORS WHEN NEEDED

SAFETY TRAINS ARE INDEPENDENT MECHANICALLY AND ELECTRICALLY

SAFETY TRAINS AUTOMATICALLY SUPPLY NITROGEN UPON LOW PRESSURE IN PIPING TO ADS ACCUMULATORS

SAFETY TRAIN SUPPLY VALVES CAN BE OPENED AND CLOSED WITH KEY LOCK CONTROL SWITCH IN MAIN CONTROL ROOM

SAFETY TRAINS POWERED BY AUTOMATIC EMERGENCY AC POWER SOURCES

HIGH PRESSURE NITROGEN GAS SUPPLY SYSTEM

2.11.13

(CONTINUED)

- OUTBOARD CONTAINMENT ISOLATION VALVES
- NON-SAFETY PORTION SUPPLIES NITROGEN TO NON-ADS ACCUMULATORS AND TO THE INSTRUMENT AIR SYSTEM WITHIN CONTAINMENT
- THE SAFETY AND NON-SAFETY PORTIONS ARE SEPARATED BY MOTOR OPERATED SHUTOFF VALVES.

ITAAC ENTRIES:

- CONFIGURATION CONFIRMED
- NITROGEN SUPPLY VALVES TESTED TO AUTOMATICALLY OPEN ON LOW PRESSURE IN ADS SUPPLY LINE AND CLOSE ON HIGH PRESSURE
- NITROGEN SUPPLY VALVES CAN BE OPENED AND CLOSED REMOTELY WITH KEY

HIGH PRESSURE NITROGEN GAS SUPPLY SYSTEM

2.11.13

(CONTINUED)

SAFETY TO NON-SAFETY SHUTOFF VALVES AUTOMATICALLY CLOSE ON LOW PRESSURE TO ADS ACCUMULATORS

ON LOSS OF NORMAL POWER, SAFETY PORTION AUTOMATICALLY SWITCHED TO EMERGENCY AC POWER

HPIN OUTBOARD CONTAINMENT VALVE CAN BE OPENED AND CLOSED REMOTELY AND MANUALLY

PORTIONS IDENTIFIED AS ASME CODE CLASS ARE REVIEWED AND HYDROSTATICALLY TESTED

CONTROL ROOM INDICATORS INSPECTED

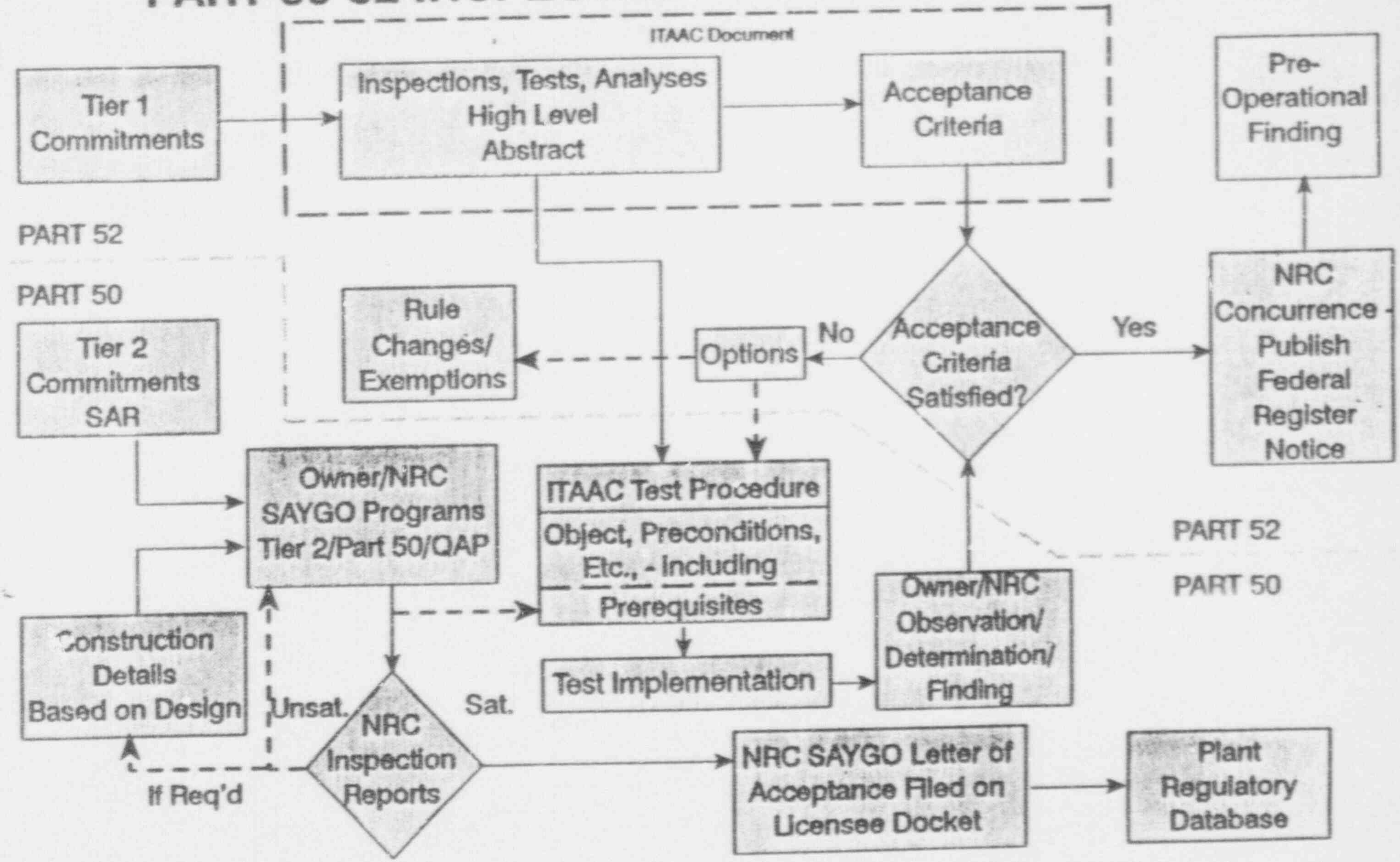
NUMARC-SPONSORED INDUSTRY REVIEW OF ABWR TIER 1/ITAAC MATERIAL

WEDNESDAY, SEPTEMBER 9, 1992

GE NUCLEAR ENERGY
SAN JOSE, CALIFORNIA

DRAFT

PART 50-52 INSPECTION PROGRAM INTERFACES



ABWR ITAAC REVIEW SCHEDULE

Wednesday, September 9, 1992

8:30 a.m. Introduction

8:45 a.m. Review of Part 52 Orientation and ITAAC Concepts
- Generic ITAAC
- DAC
- Writer's Guide

11:30 a.m. NRC Perspective

Nuclear Steam Supply Systems and Other Mechanical Systems

1:30 p.m. Nuclear Boiler System
3:00 p.m. Reactor Pressure Vessel
5:00 p.m. Reactor Recirculation

Thursday, September 10, 1992

7:30 a.m. Reactor Building Cooling Water
9:30 a.m. Off-Gas System
11:00 a.m. Residual Heat Removal System
3:00 p.m. High Pressure Core Flooder (HPCF)
5:00 p.m. Control Rod Drive System

Friday, September 11, 1992

7:30 a.m. Piping Design
10:00 a.m. Atmospheric Control System (Primary Containment)
11:00 a.m. Station Air
1:00 p.m. Instrument Air
2:00 p.m. High Pressure Nitrogen Gas Supply
3:00 p.m. Breathing Air
4:00 p.m. Reactor Service Water

Saturday, September 12, 1992

8:00 a.m. Fuel Pool Cooling and Cleanup
9:00 a.m. Drywell Cooling
10:00 a.m. Turbine Building Cooling Water
11:00 a.m. Turbine Service Water
1:00 p.m. Makeup Water (Purified)
2:00 p.m. Makeup Water (Condensate)
2:30 p.m. HVAC Normal Cooling Water
3:30 p.m. HVAC Emergency Cooling Water
4:30 p.m. Process Sampling

ABWR TIER 1/ITAAC REVIEW

AGENDA

- o INTRODUCTIONS, ATTENDEES
- o GROUNDRULES
- o HOUSEKEEPING AND LOGISTICS
- o PROPOSED REVIEW SCHEDULES
- o REVIEW OF PART 52 AND THE ITAAC CONCEPT
- o OBJECTIVES OF THE MEETING
- o LONGER TERM PLANS
- o SYSTEM-BY-SYSTEM REVIEW

ABWR TIER 1/ITAAC REVIEW

ATTENDEES

DAN WILKENS	GENE
JOE QUIRK	GENE
ANTHONY J. JAMES	GENE
ROY LOUISON	GENE
WILLIAM H. BROWN	GENE
JOHN J. SHEEHAN	GENE
ISIDRO DELAFUENTE	GENE
ADRIAN P. HEYMER	NUMARC
~~HENRY H. WINDSOR~~	~~ABB-CE~~
THOMAS A. BOYCE	NRC
~~GEORGE HESS~~	ABB-CE
JOHN REC	ABB-CE
~~CHARLES BRINKMAN~~	~~ABB-CE~~
~~JOHN CRAIG~~	~~NRC~~
ROBERT GRAMM	NRC
STEVEN P. FRANTZ	NEWMAN & HOLTZINGER
DAVID WILSON	NIAGARA MOHAWK/EPRI
EVERETT WHITAKER	TVA/EPRI
THOMAS R. MCDONNELL	BECHTEL POWER CORP.
ARMAND LANGMO	BECHTEL POWER CORP.
ALBERT Y.C. WONG	STONE & WEBSTER
WADE H. MESSER	DUKE POWER
~~DAVID L. REHN~~	~~DUKE POWER~~
WALLACE L. ZIMMERMAN	AEP
ROBERT G. COCKRELL	INPO
NINU KAUSHAL	CECO
WILLIAM G. RAMSEY	SOUTHERN CO.
MARK SANFORD	TVA
KAY MALI	DOE
~~NORMAN FLETCHER~~	~~DOE~~

GROUNDRULES

- THIS IS A NUMARC-SPONSORED INDUSTRY MEETING
  - SOWG ACTIVITY
  - W, ABB, GE PARTICIPATION OKAY

- NOMINALLY AN ABWR REVIEW, BUT INTENT IS GENERIC
  - PILOT FOR OTHER DESIGNS

ABWR TIER 1/ITAAC REVIEW

HOUSEKEEPING AND LOGISTICS

INCOMING PHONE:	(408) 925-6942 MARCIA JACKSON
INCOMING FAX:	(408) 925-1193 ATTENTION: A. J. JAMES
SECRETARIAL ASSISTANCE:	MARCIA JACKSON ROOM J-1050 - 925-6942
LUNCH:	INDIVIDUAL CHOICE (GE CAFETERIA IN BLDG. F) ESCORT REQUIRED
MEETING ROOMS:	SEE ATTACHED
ACCESS:	VISITOR BADGES VALID FOR DURATION (ESCORT REQUIRED)

ABWR TIER 1/ITAAC REVIEW

CONF. ROOMS RESERVED FOR ITAAC WORKING MEETINGS:

		WED 9/9 J-1010	TH 9/10 J-2320 AM J-1863 PM	FRI 9/11 J-1863
MON 9/14 J-1863	TUES 9/15 J-1380	WED 9/16 J-1863	TH 9/17 J-2320 AM J-1863 PM	FRI 9/18 J-1863
MON 9/21 J-1863	TUES 9/22 J-1380	WED 9/23 J-1380	TH 9/24 J-1380	FRI 9/25 J-1863
MON 9/28 J-1863	TUES 9/29 J-1010	WED 9/30 J-1863	TH 10/1 J-1010	FRI 10/2 J-1863

ROOM J-1010 FOR MEETINGS ON SATURDAYS & SUNDAYS

ROOM	TELEPHONE
J-1010	53220
J-2320	51887
J-1863	52066
J-1380	56294

ABWR TIER 1/ITAAC REVIEW

PROPOSED REVIEW SCHEDULES

- o ATTACHED NUMARC PROPOSAL IS A GOOD STARTING REFERENCE SCHEDULE
  - STAY FLEXIBLE

- o PROPOSAL IS 7-DAY/WEEK CONTINUOUS MEETING
  - INDIVIDUAL DECISIONS ON ATTENDANCE

- o BASIC PLAN IS:

MECHANICAL SYSTEMS	9/9 - 9/15
CONTROL/INSTRUMENTATION SYSTEMS	9/18 - 9/23
STATION ELECTRICAL	9/25 - 9/27
STRUCTURES	9/28 - 10/1

- o POTENTIAL NRC PARTICIPATION

9/9 - 9/10	INTRODUCTIONS
9/16 - 9/17	STATUS REVIEW
9/21 - 9/22	I&C OR MECHANICAL

ABWR TIER 1/ITAAC REVIEW

REVIEW OF PART 52 AND THE ITAAC CONCEPT

DISCUSSION TOPICS

- THE PART 50 AND PART 52 APPROACHES TO LICENSING
- THE TWO-TIER DESIGN CERTIFICATION PROCESS
- GE APPROACH TO DEVELOPMENT OF TIER 1 MATERIAL
- TYPICAL TIER 1 ENTRY
- STATUS OF GE/NRC INDUSTRY INTERACTIONS
- SUMMARY

THE PART 50 AND PART 52 APPROACHES TO LICENSING

PART 50

- o EXISTING PROCESS USED FOR ALL LICENSES TO DATE

- o TWO STEP PROCESS:

  A) CONSTRUCTION PERMIT - DESIGN PRELIMINARY, MANDATORY HEARING

  B) OPERATING LICENSE - DESIGN COMPLETE AND FINAL, HEARING UPON REQUEST

- o PROBLEMS WITH PART 50:

  A) RE-LITIGATION OF ISSUES DECIDED DURING CP

  B) EXTENSIVE OL HEARINGS LEADING TO DELAYS (AND SOME CANCELLATIONS)

  C) NEW REGULATORY REQUIREMENTS IMPOSED AT THE OL STAGE

IT'S BROKE;

FIX IT

THE PART 50 AND PART 52 APPROACHES TO LICENSING
(CONTINUED)

PART 52

- o AIMED AT MITIGATING SOME OF THE PART 50 PROBLEMS
  - FINALITY ON TECHNICAL DECISIONS
  - PREVENT RE-LITIGATION OF PREVIOUSLY DECIDED ISSUES

- o THREE SUB PARTS
  - EARLY SITE PERMITS
  - CERTIFICATION OF STANDARD DESIGNS
  - COMBINED OPERATING LICENSE AND CONSTRUCTION PERMIT (COL)

ABWR TIER 1/ITAAC REVIEW

THE PART 52 PROCESS

EARLY SITE PERMITS

- PRE-APPROVAL OF SITES

- NOT RELEVANT TO TIER 1/ITAAC DISCUSSIONS

ABWR TIER 1/ITAAC REVIEW

THE PART 52 PROCESS

CERTIFICATION OF STANDARD DESIGNS

- o APPLICATION REQUIREMENTS DEFINED IN 10 CFR PART 52.47

  - DESIGN INFORMATION COMPARABLE TO AN FSAR FOR A PART 50 OL

  - OTHER TECHNICAL INFORMATION (TMI ITEMS, PRA ....)

  - ITAAC [SEE NEXT PAGE]

  - ITAAC FOR INTERFACE BETWEEN STANDARD DESIGN AND SITE-SPECIFIC DESIGN [SEE FOLLOWING]

- o CERTIFICATION OF THE DESIGN OCCURS IN A RULE-MAKING PROCEDURE (INCLUDI[illegible] HEARINGS)

- o CERTIFICATION IS IN THE FORM OF A RULE

- o CERTIFIED DESIGN IS FINAL; NO RE-LITIGATION AT TIME OF COL

- o CHANGES TO THE CERTIFIED DESIGN REQUIRE ANOTHER RULE- MAKING PROCEDURE (OR EXEMPTION) -- BOTH WOULD INVOLVE HEARINGS

DESIGN CERTIFICATION ITAAC

§ 52.47 Contents of applications.

(a) The requirements of this paragraph apply to all applications for design certification.

(1) An application for design certification must contain:

(i) The technical information which is required of applicants for construc-

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(vi) Proposed tests, inspections, analyses, and acceptance criteria which are necessary and sufficient to provide reasonable assurance that, if the tests, inspections and analyses are performed and the acceptance criteria met, a plant which references the design is built and will operate in accordance with the design certification.

INTERFACE ITAAC

(vii) The interface requirements to be met by those portions of the plant for which the application does not seek certification. These requirements must be sufficiently detailed to allow completion of the final safety analysis and design-specific probabilistic risk assessment required by paragraph (a)(1)(v) of this section;

(viii) Justification that compliance with the interface requirements of paragraph (a)(1)(vii) of this section is verifiable through inspection, testing (either in the plant or elsewhere), or analysis. The method to be used for verification of interface requirements must be included as part of the proposed tests, inspections, analyses, and acceptance criteria required by paragraph (a)(1)(vi) of this section; and

(ix) A representative conceptual design for those portions of the plant for which the application does not seek certification, to aid the staff in its review of the final safety analysis and probabilistic risk assessment required by paragraph (a)(1)(v) of this section,

ABWR TIER 1/ITAAC REVIEW

THE PART 52 PROCESS

COMBINED OPERATING LICENSE AND CONSTRUCTION PERMIT

- APPLICATION MUST INCLUDE:
  - FSAR
  - ITAAC
- APPLICATION MAY REFERENCE A CERTIFIED DESIGN (INCLUDING ITAAC). DESIGN NOT SUBJECT TO RE-REVIEW
- MANDATORY HEARING ON NON-CERTIFIED SCOPE
- 10 CFR PART 50 APPLIES TO COL LICENSEE - INCLUDING APPENDIX B QA PROVISIONS
- SUCCESSFUL ITAAC COMPLETION RECORDED IN THE FEDERAL REGISTER
- HEARINGS PRIOR TO FUEL LOAD LIMITED TO ISSUE OF COMPLIANCE WITH ITAAC
- COMMISSION AUTHORIZES FUEL LOAD ON THE BASIS THAT ITAAC ACCEPTANCE CRITERIA HAVE BEEN MET
  - AND ONLY ON THIS

PROCEDURES FOR CHANGING DESIGN-RELATED INFORMATION

MILESTONES:		DESIGN CERTIFIED	APPLICATION FOR COMBINED LICENSE	ISSUANCE OF COMBINED LICENSE	LICENSE EXPIRES
NRC	TIER 1	•Rulemaking - 52.63(a)(1)	•Rulemaking - 52.63(a)(1)	•Rulemaking - 52.63(a)	
	TIER 2	•Rulemaking - with 50.109 standard	•Rulemaking - with 50.109 standard	•Rulemaking - with 50.109 standard	
	COL	•N/A	•Application review	•Backfit - 50.109 or 2.204	
PUBLIC AND CERTIFICATION HOLDER	TIER 1	•Rulemaking - 52.63(a)(1) (Petition per 2.802)	•Rulemaking - 52.63(a)(1) (Petition per 2.802)	•Rulemaking - 52.63(a) (Petition per 2.802)	
	TIER 2	•Rulemaking (Petition per 2.802)	•Rulemaking (Petition per 2.802)	•Rulemaking (Petition per 2.802)	
	COL	•N/A	•Combined license hearing	•Petition-52.103(b) or 2.206	
UTILITY	TIER 1	•N/A	•Exemption - 52.63(b)(1)	•Exemption - 52.63(b)(1)	
	TIER 2	•N/A	•A.15(e) "50.59-like" or application review	•A.15(e) "50.59-like" or a license amendment	
	COL	•N/A	•Application review	•License amendment - 50.90 or 52.63(b)(2)	

COL - REMAINDER OF COMBINED LICENSE APPLICATION, INCLUDING SITE-SPECIFIC DESIGN FEATURES AND RESPECTIVE ITAAC, PROPRIETARY INFORMATION, EMERGENCY PLAN, SECURITY PLAN, TRAINING, ETC., AND SUPPLEMENTARY DESIGN INFORMATION FROM DAC/ITAAC

ABWR TIER 1/ITAAC REVIEW

THE PART 52 PROCESS

KEY POINTS TO NOTE

- o HEARINGS LIMITED TO:

DESIGN CERTIFICATION	- ON THE CERTIFIED DESIGN
COL APPLICATION	- SITE-SPECIFIC INFORMATION
FUEL LOAD	- COMPLIANCE WITH ITAAC

- o CERTIFIED DESIGN NOT SUBJECT TO RECONSIDERATION AT COL STAGE

- o SITE-SPECIFIC DESIGN NOT SUBJECT TO RECONSIDERATION AT FUEL LOAD

THESE MEETINGS

ARE ONLY CONCERNED WITH THE DESIGN CERTIFICATION ELEMENT OF PART 52

- EARLY SITE PERMIT AND COL MATTERS HANDLED ELSEWHERE

THE TWO-TIER DESIGN CERTIFICATION RULE

- THE TIERED CONCEPT WAS ADOPTED AFTER PART 52 ISSUED
- INTENT IS TO AVOID HAVING TO PLACE EXCESSIVE/BURDENSOME DETAILS IN THE CERTIFIED RULE
  - CHANGES VIA RULE-MAKING ONLY

TIER 1

- CERTIFIED RULE
- CHANGES BY RULE-MAKING OR EXEMPTION (REQUIRING A HEARING)
- INCLUDES ITAAC

TIER 2

- UNCERTIFIED PORTION OF THE DESIGN
- CHANGES LESS BURDENSOME

ABWR TIER 1/ITAAC REVIEW

THE TWO-TIER DESIGN CERTIFICATION PROCESS

TIER 1

- A DESIGN DEFINITION THAT IS A SUBSET OF TIER 2; PRINCIPAL DESIGN BASES AND DESIGN FEATURES
- ITAAC; CONFIRM THE AS-BUILT COMPLIES WITH THE TIER 1 CERTIFIED DESIGN

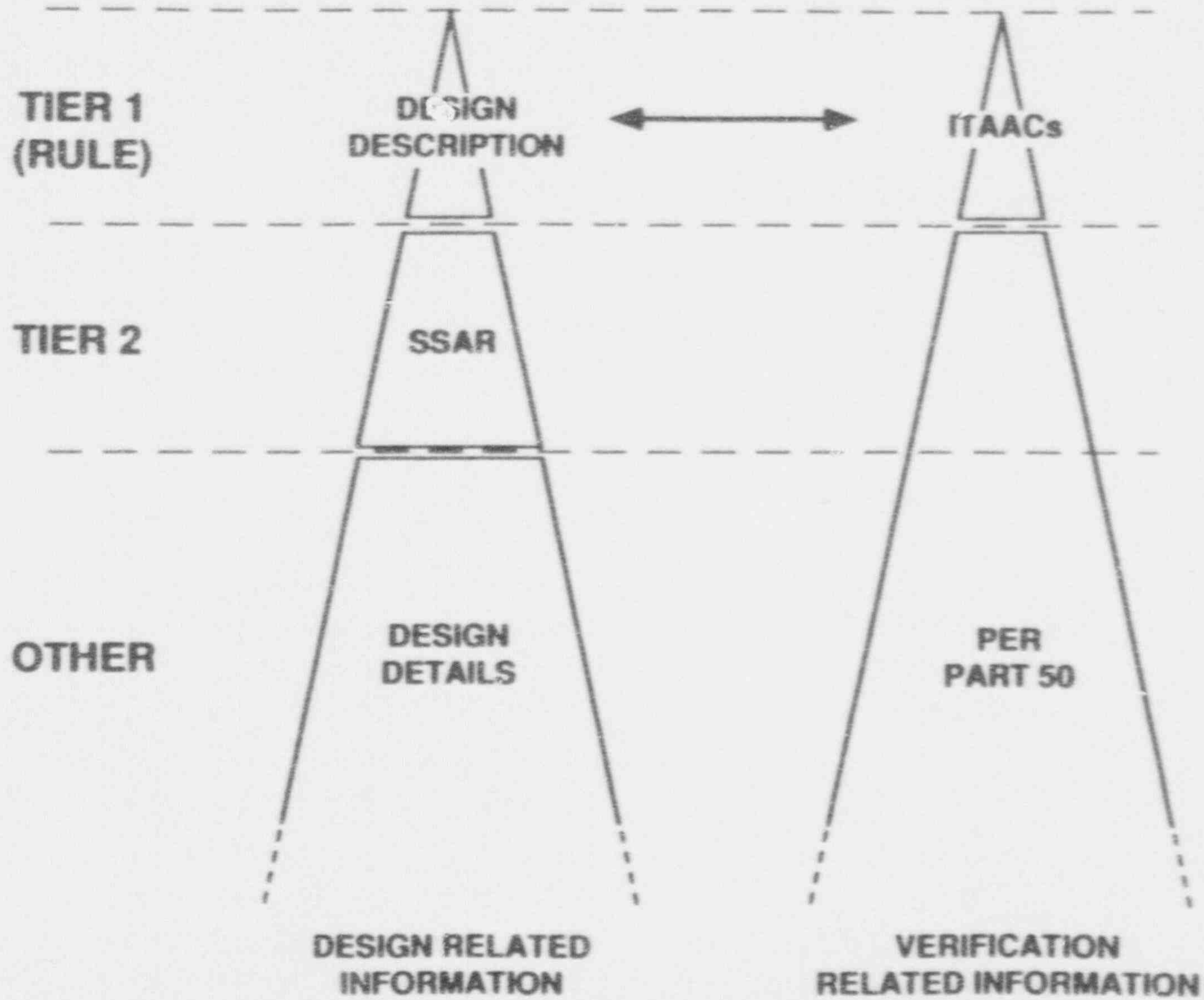
TIER 2

- SAR
- RESPONSES TO NRC RAI
- ADDITIONAL INFORMATION RESULTING FROM DESIGN CERTIFICATION HEARINGS
- NRC FSER ITEMS

"TIER 3"

- MANY DESIGN DETAILS BELOW THE SAR LEVEL

DESIGN CERTIFICATION



ABWR TIER 1/ITAAC REVIEW

GE APPROACH TO DEVELOPMENT OF TIER 1 MATERIAL

- SUBMIT THE ABWR SAR AND OBTAIN NRC REVIEW/CONCURRENCE

- DEVELOP THE TIER 1 DESIGN DESCRIPTION (DD)

  - TOP-LEVEL INFORMATION; SUBSET OF SAR DESIGN

- DEVELOP ITAAC BASED ON CONFIRMING THE AS-BUILT FACILITY COMPLIES WITH THE TIER 1 CERTIFIED DESIGN

- DEVELOP OTHER TIER 1 ENTRIES

- RELY ON THE EXISTING PART 50 QA PROCESSES TO VERIFY THE NON-TIER 1 ASPECTS OF THE DESIGN

JUDGEMENT CALLS INVOLVED

ABWR TIER 1/ITAAC REVIEW

ELEMENTS INCLUDED IN TIER 1

ELEMENT	INTENT
DESIGN DESCRIPTION(S)	THE CERTIFIED DESIGN
INSPECTION, TESTS, ANALYSES AND ACCEPTANCE CRITERIA (ITAAC)	VERIFY THAT SPECIFIC FEATURES OF THE AS-BUILT FACILITY COMPLY WITH THE CERTIFIED DESIGN
DESIGN ACCEPTANCE CRITERIA (DAC)	AN ITAAC ON THE DESIGN PROCESS WHEN DESIGN DETAILS ARE (LEGITIMATELY) NOT AVAILABLE AT THE TIME OF DESIGN CERTIFICATION
INTERFACE ITAAC	VERIFY THAT SITE-SPECIFIC FEATURE(S) COMPLY WITH REQUIREMENTS OF THE CERTIFIED DESIGN
GENERIC ITAAC	VERIFY THAT GENERIC ASPECTS OF THE AS-BUILT FACILITY COMPLY WITH THE CERTIFIED DESIGN (E.G., EQ)

ABWR TIER 1/ITAAC REVIEW

CHARACTERISTICS OF TIER 1 ENTRIES

DOCUMENTATION SCOPE AND STRUCTURE

FORM

OPTIONS: 1. SAR STRUCTURE

2. SYSTEM-BY-SYSTEM PER GE PRODUCT STRUCTURE

CHOICE: SYSTEM-BY-SYSTEM
(138 ABWR SYSTEMS)

SCOPE

OPTIONS: 1. SAFETY-RELATED SYSTEMS ONLY

2. ALL SYSTEMS ADDRESSED IN THE SAR

CHOICE: ALL SYSTEMS ADDRESSED IN THE SAR (~140) GRADED TO REFLECT SIGNIFICANCE

ABWR TIER 1/ITAAC REVIEW

CHARACTERISTICS OF TIER 1 ENTRIES

DESIGN DESCRIPTIONS

- o DESCRIBES THE PRINCIPAL DESIGN BASES AND DESIGN FEATURES OF THE FACILITY; DRAWN FROM SAR DESIGN DESCRIPTIONS
- o SYSTEM BASED APPROACH WITH LEVEL OF DETAIL GRADED TO REFLECT SYSTEM IMPORTANCE TO SAFETY
- o CONTAINS ONLY TECHNICAL INFORMATION ALREADY COVERED IN TIER 2 (SAR)
- o DOES NOT ADDRESS PLANT OPERATING CONDITIONS (COVERED BY TECH. SPECS.)
- o INCLUDES NUMERICAL INFORMATION TO THE EXTENT NECESSARY TO IDENTIFY PRINCIPAL DESIGN BASES AND FEATURES
- o SELF-CONTAINED AND AVOIDS DIRECT REFERENCES TO TIER 2 DOCUMENTS
- o MAY INCLUDE SIMPLIFIED P&ID'S, ONE-LINE DIAGRAMS, GENERAL ARRANGEMENT DRAWINGS WHICH ADDRESS THE DESIGN FEATURES IN THE TEXT OF THE TIER 1 DESIGN DESCRIPTION
- o MUST BE NONPROPRIETARY INFORMATION
- o AS A GENERAL RULE, DIRECT REFERENCES TO CODES, STANDARDS AND REGULATIONS ARE AVOIDED

ABWR TIER 1/ITAAC REVIEW

CHARACTERISTICS OF TIER 1 ENTRIES

ITAAC

- AIMED AT CONFIRMING THE AS-BUILT FACILITY COMPLIES WITH THE CERTIFIED DESIGN

- WILL NOT INCLUDE SUCH NON-DESIGN ISSUES AS:
  - OPERATING PROCEDURES
  - MAINTENANCE PROGRAMS
  - TRAINING
  - QA PROGRAM ELEMENTS

- SYSTEM-BASED AND DERIVED FROM (AND ADDRESSES MOST OF) THE TIER 1 DESIGN DESCRIPTION

- MUST BE AS OBJECTIVE, UNAMBIGUOUS AS POSSIBLE TO AVOID OPPORTUNITIES FOR SUBJECTIVE INTERPRETATIONS AT THE TIME OF FUEL LOAD

- NUMERICAL VALUES MAY HAVE RANGES OR TOLERANCES

- THE ITAAC PROCESS ENDS AT FUEL LOAD
  - POST-FUEL LOAD TESTING NOT IN ITAAC (LICENSE CONDITION)

- UTILIZE ELEMENTS OF EXISTING NUCLEAR POWER PLANT VERIFICATION PROGRAMS

ABWR TIER 1/ITAAC REVIEW

DESIGN ACCEPTANCE CRITERIA (DAC)

- THE APPROACH IS TO BE USED IN AREAS WHERE (FOR LEGITIMATE REASON) THERE IS INSUFFICIENT DESIGN DETAIL AT THE TIME OF CERTIFICATION UPON WHICH TO BASE A SAFETY FINDING

- APPLICATION IS LIMITED TO A FEW SELECTED AREAS:

  CRITERIA

  A) BENEFICIAL TECHNOLOGY EVOLUTION ANTICIPATED

  B) ADDITIONAL DESIGN DETAILS ARE DEPENDENT UPON AS-BUILT, AS-PROCURED HARDWARE

  APPLICATION

  A) PIPING DESIGN

  B) RADIATION PROTECTION

  C) CONTROL AND INSTRUMENTATION ISSUES

- OUTLINES OF THE PROCESS ARE:

  A) THE SAR CONTAINS THE FULL COMPLEMENT OF DESIGN REQUIREMENTS

  B) INCLUDE IN THE SAR A DESCRIPTION OF THE PROCESSES FOR TRANSLATING SAR REQUIREMENTS INTO OPERATIONAL HARDWARE

  C) DEVELOP TIER 1 DAC TO VERIFY IMPLEMENTATION OF THE PROCESSES DEFINED IN THE SAR

- SCOPE OF DAC IS COMPATIBLE WITH THE TOP-LEVEL NATURE OF TIER 1

- PREVIOUS IMPLEMENTATION EXPERIENCE PROVIDES CONFIDENCE IN THE PROCESS

CHARACTERISTICS OF TIER 1 ENTRIES

INTERFACE ITAAC

FOR THOSE PORTIONS OF THE PLANT FOR WHICH THE APPLICATION DOES NOT SEEK CERTIFICATION, PART 52 REQUIRES:

A) INTERFACE REQUIREMENTS WHICH MUST BE MET AS WELL AS A CONCEPTUAL DESIGN TO SUPPORT PRA STUDIES (TIER 2)

B) ITAAC THAT WILL VERIFY DETAIL DESIGNS COMPLY WITH THE INTERFACE REQUIREMENTS

ABWR INTERFACE ITAAC CANDIDATES:

ULTIMATE HEAT SINK

CONDENSATE MAKE-UP FACILITY

OFFSITE POWER SYSTEM

POTABLE AND SANITARY WATER SYSTEM

SERVICE WATER SYSTEMS

GENERIC ITAAC

INTENT: GROUP INTO A SINGLE MODULE DESIGN/CONSTRUCTION ACTIVITIES WHICH SPAN MORE THAN ONE SYSTEM

STANDING: PERMITTED BUT NOT REQUIRED BY PART 52. USE ON AN AS-APPROPRIATE BASIS

CURRENT CANDIDATES: ENVIRONMENTAL QUALIFICATION

INSTRUMENT SET POINTS

WELDING

SOFTWARE DEVELOPMENT AND VERIFICATION

TYPICAL TIER 1 ENTRY

STANDBY LIQUID CONTROL SYSTEM (SLCS)

2.2.4 Standby Liquid Control System

The Standby Liquid Control (SLC) System is designed to inject neutron absorbing poison using a boron solution into the reactor and thus provide back-up reactor shutdown capability independent of the normal reactivity control system based on insertion of control rods into the core. The SLC System is capable of operation over a wide range of reactor pressure conditions up to and including the elevated pressures associated with an anticipated plant transient coupled with a failure to scram (ATWS).

The SLC System is designed to bring the reactor, at any time in a cycle, and at all conditions, from full power to a subcritical condition, with the reactor in the most reactive xenon-free state, without control rod movement. The system will inject the minimum required boron solution in 61 minutes.

The SLC System (Figure 2.2.4) consists of a boron solution storage tank, two positive displacement pumps, two motor-operated injection valves which are provided in parallel for redundancy, and associated piping and valves used to transfer borated water from the storage tank to the reactor pressure vessel (RPV). The borated solution is discharged through the 'B' high pressure core flooder (HPCF) subsystem sparger. Key equipment performance requirements are:

(1)	Pump flow (minimum)	100 gpm with both pumps running
(2)	Maximum reactor pressure (for injection)	1250 psig
(3)	Pumpable volume in storage tank (minimum)	6100 U.S. gal

The required volume of solution contained in the storage tank is dependent upon the solution concentration, and this concentration can vary during reactor operations. A required boron solution volume/concentration relationship is used to define acceptable SLC System storage tank conditions during plant operation.

The SLC System is automatically initiated during an ATWS. An ATWS condition exists when either of the following occurs:

(1) High RPV pressure (1125 psig) and Average Power Range Monitor (APRM) not down scale for 3 minutes, or

(2) Low RPV level (Level 2) and APRM not down scale for 3 minutes.

When the SLC System is automatically initiated to inject a liquid neutron absorber into the reactor, the following devices are actuated:

(1) The two injection valves are opened.

(2) The two storage tank discharge valves are opened.

(3) The two injection pumps are started.

(4) The reactor water cleanup isolation valves are closed.

The SLC System can also be manually initiated from the main control room. When it is manually initiated to inject a liquid neutron absorber into the reactor, the following devices are actuated by each switch:

(1) One of the two injection valves is opened.

(2) One of the two storage tank discharge valves is opened.

(3) One of the two injection pumps is started.

(4) One of the reactor water cleanup isolation valves is closed.

The SLC System provides borated water to the reactor core to compensate for the various reactivity effects during the required conditions. These effects include xenon decay, elimination of steam voids, changing water density due to the reduction in water temperature, Doppler effect in uranium, changes in neutron leakage, and changes in control rod worth as boron affects neutron migration length. To meet this objective, it is necessary to inject a quantity of boron which produces a minimum concentration of 850 ppm of natural boron in the reactor core at 70°F. To allow for potential leakage and imperfect mixing in the reactor system, an additional 25% (220) is added to the above requirement. The required concentration is thus achieved, accounting for dilution in the RPV with normal water level and including the volume in the RHR shutdown cooling piping. This quantity of boron solution is the amount which is above the pump suction shutoff level in the tank, thus allowing for the portion of the tank volume which cannot be injected.

The pumps are capable of producing discharge pressure to inject the solution into the reactor when the reactor is at high pressure conditions corresponding to the system relief valve actuation (1560 psig), which is above peak ATWS pressure.

The SLC System includes sufficient control room indication to allow for the necessary monitoring and control during design basis operational conditions. This includes pump discharge pressure, storage tank liquid level and temperature, as well as valve open/close and pump on/off indication for those components shown on Figure 2.2.4 (with the exception of the simple check valves).

The SLC System uses a dissolved solution of sodium pentaborate as the neutron-absorbing poison. This solution is held in a storage tank which has a heater to maintain solution temperature above the saturation temperature. The heater is capable of automatic operation and automatic shutoff to maintain an acceptable solution temperature. The SLC System solution tank, a test water tank, the two positive displacement pumps, and associated valving are all located in the secondary containment on the floor elevation below the operating floor. This is a Seismic Category I structure, and the SLC System equipment is protected from phenomena such as earthquakes, tornados, hurricanes, and floods, as well as from internal postulated accident phenomena. In this area, the SLC System is not subject to conditions such as missiles, pipe whip, and discharging fluids.

The pumps, heater, valves, and controls are powered from the standby power supply or normal offsite power. The pumps and valves are powered and controlled from separate buses and circuits so that single active failure will not prevent system operation. The power supplied to one motor-operated injection valve, storage tank discharge valve, and injection pump is powered from Division I, 48 VAC. The power supply to the other motor-operated injection valve, storage tank outlet valve, and injection pump is powered from Division II, 480 VAC. The power supply to the tank heaters and heater controls is connectable to a standby power source. The standby power source is Class 1E from an on-site source and is independent of the off-site power.

Components of the SLC System which are required for injection of the neutron absorber into the reactor are classified Seismic Category I. The major mechanical components are designed to meet ASME Code requirements as shown below:

Component	ASME Code Class	Design Conditions Pressure	Design Conditions Temperature
Storage Tank	2	Static Head	150°F
Pump	2	1560 psig	150°F
Injection Valves	1	1560 psig	150°F
Piping Inboard of Injection Valves	1	1250 psig	575°F

Piping and components not required for the injection of the neutron absorber (e.g., test tank, sampling system line, and storage tank vent) are classified Non-Nuclear Safety (NNS).

Design provisions to permit system testing include a test tank and associated piping and valves. The tank can be supplied with demineralized water which can be pumped in a closed loop through either pump or injected into the reactor.

The SLC System is separated both physically and electrically from the Control Rod Drive System.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.2.4 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria, which will be undertaken for the SLC System.

Table 2.2.4: Standby Liquid Control System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The minimum average poison concentration in the reactor after operation of the SLC System shall be equal to or greater than 850 ppm.	1. Construction records, revisions and plant visual examinations will be undertaken to assess as-built parameters listed below for compatibility with SLC System design calculations. If necessary, an as-built SLC System analysis will be conducted to demonstrate that the acceptance criteria are met. **Critical Parameters:** a. Storage tank pumpable volume b. RPV water inventory at 70°F c. RHR shutdown cooling system water inventory at 70°F	1. It must be shown the SLC System can achieve a poison concentration of 850 ppm or greater, assuming a 25% dilution due to non-uniform mixing in the reactor and accounting for dilution in the RHR shutdown cooling systems. This concentration must be achieved under system design basis conditions. This requires that the SLC System meet the following values: a. Storage tank pumpable volume range 6100-6800 gal. b. RPV water inventory $\leq 1.00 \times 10^6$ lb c. RHR shutdown cooling system inventory $\leq 0.287 \times 10^6$ lb
2. A simplified system configuration is shown in Figure 2.2.4.	2. Inspections of installation records, together with plant walkdowns, will be conducted to confirm that the installed equipment is in compliance with the design configuration defined in Figure 2.2.4.	2. The system configuration is in accordance with Figure 2.2.4.

Table 2.2.4: Standby Liquid Control System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The SLC System shall be capable of delivering 100 gpm of solution with both pumps operating against the elevated pressure conditions which can exist in the reactor during events involving SLC System initiation.	3. System preoperation tests will be conducted to demonstrate acceptable pump and system performance. These tests will involve establishing test conditions that simulate conditions which will exist during an SLC System design basis event. To demonstrate adequate Net Positive Suction Head (NPSH), delivery of rated flow will be confirmed by tests conducted at conditions of low level and maximum temperature in the storage tank, and the water will be injected from the storage tank to the RPV.	3. It must be shown that the SLC System can automatically inject 100 gpm (both pumps running) against a reactor pressure of 1250 psig with simulated ATWS conditions. It must also be shown that the SLC System pumps can pump the entire storage tank pumpable volume.
4. The system is designed to permit in-service functional testing of the SLC System.	4. Field tests will be conducted after system installation to confirm that in-service system testing can be performed.	4. Using normally installed controls, power supplies and other auxiliaries, the system has the capability to perform: a. Pump tests in a closed loop on the test tank. b. RPV injection tests using demineralized water from the test tank.
5. The pump, heater, valves and controls can be powered from the standby AC power supply as described in Section 2.2.4.	5. System tests will be conducted after installation to confirm that the electrical power supply configurations are in compliance with design commitments.	5. The installed equipment can be powered from the standby AC power supply.
6. SLC System components which are required for the injection of the neutron absorber into the reactor are classified Seismic Category I and qualified for appropriate environment for locations where installed.	6. See Generic Equipment Qualification verification activities (IA).	6. See Generic Equipment Qualification Acceptance Criteria (AC).

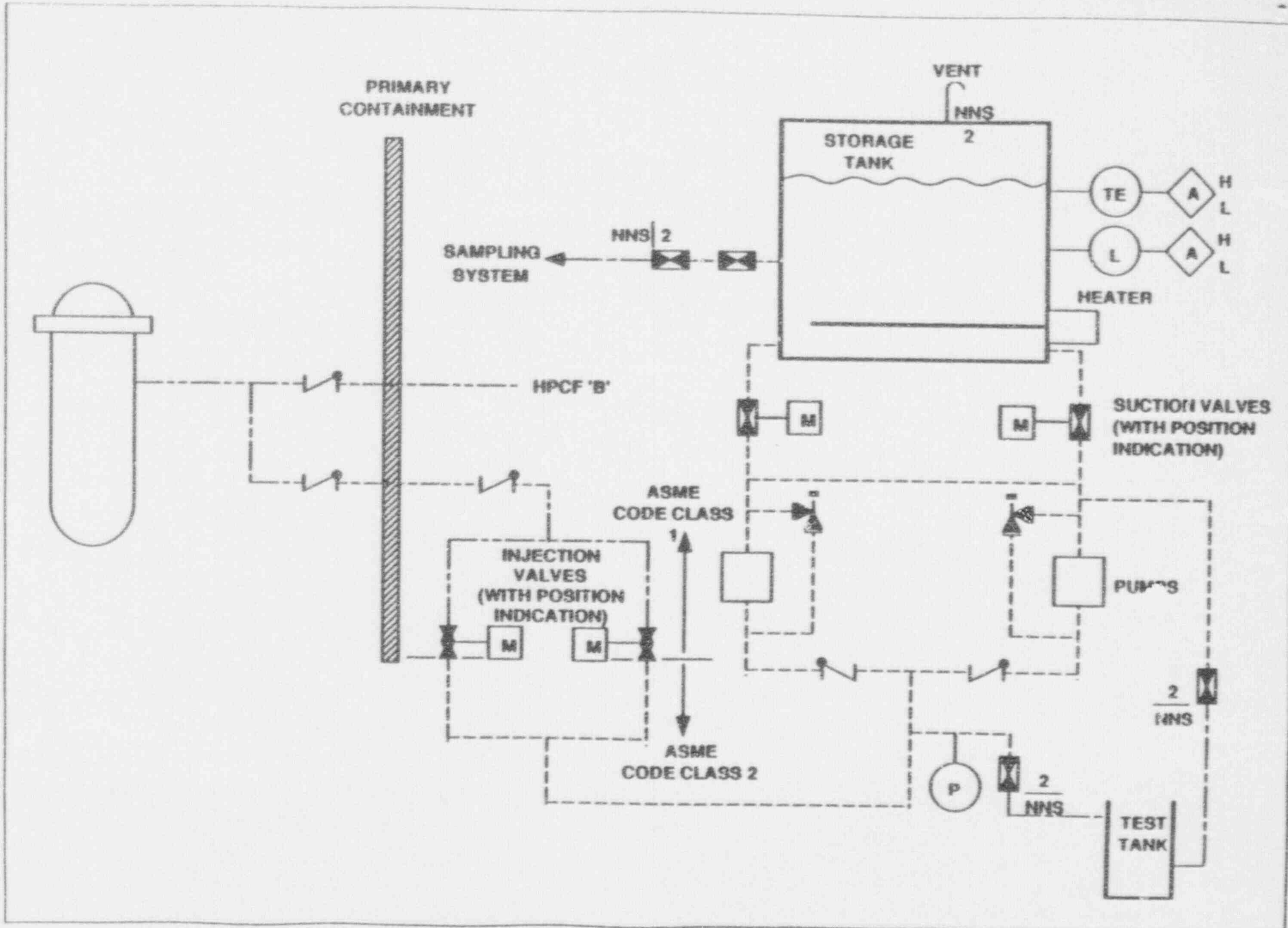


Figure 2.2.4 Standby Liquid Control System (Standby Mode)

ABWR TIER 1/ITAAC REVIEW

STATUS OF GE/NRC/INDUSTRY INTERACTIONS

A. NRC: MULTIPLE INTERACTIONS

DATE	WHAT
9/91	STAGE 1: GE SUBMITTED 9 PILOTS
3/92	STAGE 2: GE SUBMITTED APPROXIMATELY 30 SYSTEMS
5/92	STAGE 3: GE SUBMITTED A COMPLETE TIER 1 PACKAGE
8/92	NRC ISSUED 250 PAGES OF CONSOLIDATED COMMENTS

STATUS: MANY OPEN ISSUES

ABWR TIER 1/ITAAC REVIEW

STAGE 3 SYSTEM TREATMENT

SUMMARY:

SYSTEMS	138
GENERIC	4
DAC	4
INTERFACE	9
PROGRAM ENTRY ONLY	1

SYSTEM TREATMENT:

DESIGN DESCRIPTION AND ITAAC:	82
DESIGN DESCRIPTION ONLY:	17
NAME ONLY:	17
NAME ONLY BUT COVERED IN OTHER SYSTEMS:	22

ABWR TIER 1/ITAAC REVIEW

STATUS: GE/NRC REVIEW OF ABWR TIER 1

- o GE HAS SUBMITTED ≈100% OF PROPOSED ABWR TIER 1 MATERIAL
  - 115 SYSTEMS + OTHERS
  - ROAD MAPS AND OTHER CLEANUP ITEMS IN PROGRESS

- o INTERACTIONS TO DATE INDICATE CONSENSUS ON BASIC SCOPE AND CONTENT
  - MANY DETAILS OPEN
  - NOT CLEAR THAT THERE IS REALLY CONSENSUS ON THE BASICS

- o NRC HAS REVIEWED THE JUNE 1 STAGE 3 SUBMITTAL
  - COMMENTS RECEIVED 8/20/92
    - GE EVALUATION IN PROGRESS; PRELIMINARY ASSESSMENT INDICATES PART 52 NOT UNIFORMLY UNDERSTOOD

- o ANTICIPATE INTENSIVE INTERACTIONS OVER THE NEXT FEW MONTHS

ABWR TIER 1/ITAAC REVIEW

PRELIMINARY GE ASSESSMENT OF NRC STAGE 3 COMMENTS

- o MANY VALID COMMENTS: A LOT MIRROR UTILITY AND INTERNAL GE REVIEW FINDINGS

- o COVER LETTER SAYS STAFF "IN GENERAL AGREEMENT WITH APPROACH"

    - MANY COMMENTS CLEARLY DEMONSTRATE THAT INDIVIDUAL REVIEWERS DO NOT HAVE A UNIFORM UNDERSTANDING OF PART 52 (INCLUDING GREYBEARDS AND REGIONS)

- o TIER 1 REVIEW IS STIMULATING A RE-REVIEW OF THE SAR DESIGN

- o TIER 1 REVIEW IS SEEN BY REVIEWERS AS AN OPPORTUNITY TO REVISIT SAR LEVEL-OF-DETAIL ISSUES

- o REQUESTED SCHEDULES FOR RESUBMITTAL OF CERTIFIED TIER 1 MATERIAL ARE IMPOSSIBLE/UNWARRANTED/COUNTERPRODUCTIVE

ABWR TIER 1/ITAAC REVIEW

SUMMARY OF AREAS OF GE AGREEMENT WITH NRC STAGE 3 COMMENTS

ISSUE AND NRC COMMENT	GE OBSERVATION
TIER 1 AND SAR NEED TO BE CONSISTENT (AND ARE NOT IN SOME CASES)	AGREE; WILL FIX ANY INCONSISTENCIES
SOME OVERLAP IN ITAAC COLUMN ENTRIES	AGREE; WILL FIX BUT SOME OVERLAP UNAVOIDABLE
CODES/STANDARDS; TIER 1 IDENTIFIES THE BASIC CODE, TIER 2 IDENTIFIES THE VERSION (UNLESS COVERED IN 50.55A)	AGREE; NOTE ITEM L ON NEED TO MINIMIZE REFERENCES TO CODES AND STANDARDS
USE OF UNSPECIFIC TERMS SHOULD BE AVOIDED	AGREE; WILL FIX
TIER 1 HAS MIXED UNITS (METRIC AND CUSTOMARY AMERICAN)	AGREE; GOING 100% METRIC, WILL FIX IN REVISIONS
TIER 1 DIAGRAMS ARE INADEQUATE AS A BASIS FOR CONFIGURATION VERIFICATION	AGREE; ITAAC BEING MODIFIED TO CALL FOR VERIFICATION AGAINST THE DESIGN DESCRIPTION. FIGURES ARE USED TO DEPICT FUNCTIONAL RELATIONSHIPS
TERMS SUCH AS INSPECTION, REVIEW NEED TO BE DEFINED	AGREE; DEFINITIONS BEING ADDED

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

1. MAJOR

A. PURPOSE OF ITAAC

B. TIER 1 LEVEL OF DETAIL

C. THE PART 50/PART 52 RELATIONSHIP

D. TIER 1 ACCEPTANCE CRITERIA SPECIFICITY - HOW MUCH IS NEEDED?

E. GENERIC ITAAC - THEIR ROLE

F. WHICH SYSTEM TO TREAT IN TIER 1 (AND HOW)

G. DESIGN DESCRIPTION/ITAAC RELATIONSHIP

H. SCHEDULES AND FDA/TIER 1 COUPLING

I. PROGRAMMATIC TIER 1 ENTRIES

J. BRIDGE DOCUMENT CONCEPT

K. ROAD MAPS AND THEIR STATUS

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

1. MAJOR (CONTINUED)

L. TIER 1 TREATMENT OF CODES AND STANDARDS

M. INTERFACE ITAAC SCOPE/CONTENT

N. TIER 1 CERTIFICATION (QA COMPLIANCE)

O. TEST CONDITIONS AND ALGORITHMS

P. I, T, A CONTENT (PROCESS INSPECTION VS. FIELD MEASUREMENTS)

Q. CONSISTENCY AMONG SYSTEMS

R. CROSS REFERENCES

2. SECONDARY

A. TREATMENT OF NUMBERS

B. STATUS OF TIER 1 DIAGRAMS

C. SYSTEM GROUPINGS (ORDER TREATED IN TIER 1)

D. MULTIPLE UNIT SITES

REVIEW OF ITEMS LACKING CONSENSUS

2. SECONDARY (CONTINUED)

E. SITE PARAMETER USAGE

F. EQUIPMENT IDENTITIES (NUMBERS) ON SIMPLIFIED TIER 1 DIAGRAMS

G. HEAT EXCHANGER TESTING

H. GENERIC ITAAC FOR MOV AND POWER OPERATED VALVES

ABWR TIER 1/ITAAC REVIEW

STATUS OF GE/NRC/INDUSTRY INTERACTIONS

o CONTINUOUS INDUSTRY INVOLVEMENT IN ABWR TIER 1 DEVELOPMENT

- INDUSTRY TRIAL BLAZER

DATE	WHAT
9/91	NUMARC REVIEW OF PILOTS
6/92	NUMARC + LEGAL REVIEW OF STAGE 3 (PARTIAL)
ONGOING	VARIOUS REVIEWS OF PACKAGES

STATUS: INDUSTRY VERY CONCERNED WITH SOME TRENDS

o GE HAS MODIFIED STAGE 3 TO REFLECT THE 6/92 REVIEW AND INDUSTRY CONCERNS

- YOU HAVE THIS MARK-UP

ABWR TIER 1/ITAAC REVIEW

STATUS: INDUSTRY REVIEW OF ABWR TIER 1

o REVIEWS CONDUCTED UNDER AUSPICES OF NUMARC STANDARDIZATION OVERSIGHT WORKING GROUP (SOWG)
  - UTILITIES
  - EPRI
  - INPO
  - A/E'S

o REVIEWS IN PARALLEL WITH NRC
  - APPROXIMATELY 20 SYSTEMS COVERED SO FAR
  - MAJOR ACTIVITIES SCHEDULED IN SEPTEMBER/OCTOBER

o REVIEW OBJECTIVE
  - SCOPE OF TIER 1
  - ITAAC SPECIFIC, OBJECTIVE

o INDUSTRY CONCERNED WITH SEVERAL ASPECTS OF GE TIER 1:
  - CHANGES NEEDED TO REFLECT LEGAL SIGNIFICANCE OF TIER 1
  - ACCEPTANCE CRITERIA NEED TO BE MORE PRECISE, UNAMBIGUOUS
  - REDUCE THE AMOUNT OF TIER 1 MATERIAL FOR NON-SAFETY SYSTEMS
  - STRONG DESIRE TO ELIMINATE GENERIC ITAAC
  - CHANGES SIMILAR TO NRC REQUESTS (CONSISTENCY, ETC.)

o ADDITIONAL REVIEWS SCHEDULE FOR SEPTEMBER AND INTERACTIONS WITH NRC BEING PROPOSED FOR OCTOBER

ABWR TIER 1/ITAAC REVIEW

SUMMARY

- TIER 1 IS TOP LEVEL
  - JUDGEMENT CALLS

- ITAAC ARE AIMED AT AS-BUILT COMPLIANCE WITH THE TIER 1 CERTIFIED DESIGN

- MANY GUIDELINES/PRINCIPLES NOT AGREED TO WITH NRC

- GE RESUBMITTAL WILL BE PER INDUSTRY INTERPRETATION OF PART 52

- INDUSTRY (NUMARC) REVIEW/INPUT IS OF CRUCIAL IMPORTANCE

- LOTS OF TOUGH, MESSY TRENCH WARFARE AHEAD

TIER 1: KEY TO PART 52 SUCCESS

ABWR TIER 1/ITAAC REVIEW

OBJECTIVES OF THE REVIEW

THE REVIEW IS INTENDED TO:

- BE A 100% REVIEW OF THE ABWR TIER 1 MATERIAL
  - GENERIC APPLICABILITY

- PROVIDE INDUSTRY INSIGHTS ON TIER 1 SCOPE AND CONTENT:
  - SUFFICIENTLY OBJECTIVE
  - ALTERNATIVE ENTRIES
  - HOW TO HANDLE DAC/GENERIC ISSUES

- IDENTIFY RECOMMENDED CHANGES

- INCLUDE SAMPLES OF PWR ITAAC FOR CONSISTENCY CHECKS

- SUPPORT INTERACTIONS WITH NRC STAFF
  (NOW AND AFTER RESUBMITTAL)

THE REVIEW IS NOT INTENDED TO BE:

- AN ABWR DESIGN REVIEW

ABWR TIER 1/ITAAC REVIEW

LONGER TERM PLANS

1992 TIMING	ACTIVITY
SEPTEMBER	COMPLETE THE INDUSTRY/NUMARC REVIEW - INCLUDE SOWG OVERVIEW - PWR INVOLVEMENT FACTOR IN (AS APPROPRIATE) NRC COMMENTS
LATE SEPTEMBER EARLY OCTOBER	SUBMIT MARKED-UP REVISIONS OF THE TIER 1 PACKAGE TO NRC * DOCUMENT AND SUBMIT SUMMARY OF NRC COMMENT DISPOSITION - INCLUDED IN REVISION - NOT INCLUDE AND WHY - OTHER DISPOSITION
OCTOBER	GE/INDUSTRY/STAFF DISCUSSION OF EACH SYSTEM TIER 1 *
NOVEMBER	GE TIER 1 CERTIFICATION/VERIFICATION

* NRC HAS NOT YET AGREED TO THIS APPROACH

ADDENDUM: SUMMARY OF TIER 1 ISSUES LACKING GE/NRC/ INDUSTRY CONSENSUS

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

1. MAJOR

A. PURPOSE OF ITAAC

B. TIER 1 LEVEL OF DETAIL

C. THE PART 50/PART 52 RELATIONSHIP

D. TIER 1 ACCEPTANCE CRITERIA SPECIFICITY - HOW MUCH IS NEEDED?

E. GENERIC ITAAC - THEIR ROLE

F. WHICH SYSTEM TO TREAT IN TIER 1 (AND HOW)

G. DESIGN DESCRIPTION/ITAAC RELATIONSHIP

H. SCHEDULES AND FDA/TIER 1 COUPLING

I. PROGRAMMATIC TIER 1 ENTRIES

J. BRIDGE DOCUMENT CONCEPT

K. ROAD MAPS AND THEIR STATUS

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

1. MAJOR (CONTINUED)

L. TIER 1 TREATMENT OF CODES AND STANDARDS

M. INTERFACE ITAAC SCOPE/CONTENT

N. TIER 1 CERTIFICATION (QA COMPLIANCE)

O. TEST CONDITIONS AND ALGORITHMS

P. I, T, A CONTENT (PROCESS INSPECTION VS. FIELD MEASUREMENTS)

Q. CONSISTENCY AMONG SYSTEMS

R. CROSS REFERENCES

2. SECONDARY

A. TREATMENT OF NUMBERS

B. STATUS OF TIER 1 DIAGRAMS

C. SYSTEM GROUPINGS (ORDER TREATED IN TIER 1)

D. MULTIPLE UNIT SITES

REVIEW OF ITEMS LACKING CONSENSUS

2. SECONDARY (CONTINUED)

E. SITE PARAMETER USAGE

F. EQUIPMENT IDENTITIES (NUMBERS) ON SIMPLIFIED TIER 1 DIAGRAMS

G. HEAT EXCHANGER TESTING

H. GENERIC ITAAC FOR MOV AND POWER OPERATED VALVES

ITEM:

ISSUE(S):

INDUSTRY/GE
POSITION:

NRC POSITION:

PROPOSED
RESOLUTION:

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	A: PURPOSE OF ITAAC
ISSUES(S):	IT IS NOT CLEAR THAT THE INTENT OF ITAAC IS FULLY UNDERSTOOD BY ALL NRC REVIEW ORGANIZATIONS
INDUSTRY/GE POSITION:	PER 10 CFR PART 52.47, ITAAC ASSURE THAT THE AS-BUILT CONFORMS TO THE CERTIFIED DESIGN. FURTHERMORE, TIER 1 IS LIMITED TO TOP-LEVEL DESIGN CRITERIA AND FEATURES (SECY 90-241, 90-377, 91-178)
NRC POSITION:	GE BELIEVES KNOWLEDGEABLE STAFF MANAGEMENT CONCURS WITH INDUSTRY INTERPRETATION. OTHER NRC GROUPS APPEAR TO BE UNFAMILIAR WITH PART 52
PROPOSED RESOLUTION:	INTERACTIONS TO ENSURE COMMON UNDERSTANDING

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	B: TIER 1 LEVEL OF DETAIL
ISSUE(S)	MANY NRC COMMENTS CALL FOR A SIGNIFICANT AMOUNT OF ADDITIONAL DETAIL IN TIER 1.
INDUSTRY/GE POSITION:	CURRENT LEVEL OF DETAIL IS APPROPRIATE AND IS CONSISTENT WITH THE TIERED CONCEPT AS AGREED TO THROUGH PILOT REVIEW
NRC POSITION:	NOT CLEAR. GE UNDERSTOOD THE PILOTS HAD SETTLED THIS ISSUE
PROPOSED RESOLUTION:	UPDATED ABWR TIER 1 TO RETAIN CURRENT LEVEL OF DETAIL

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	C: THE PART 50/52 RELATIONSHIP
ISSUE(S):	UNDER PART 52, VERIFICATION THAT THE AS-BUILT PLANT MEETS ALL THE SAR COMMITMENTS IS ACHIEVED BY A COMBINATION OF PART 52 ITAAC (TIER 1) AND THE VERIFICATION ACTIVITIES DERIVING FROM PART 50 QA PROVISIONS. SEVERAL NRC COMMENTS SUGGEST THIS CONCEPT IS NOT WIDELY UNDERSTOOD. FOR EXAMPLE, SUGGESTIONS THAT ITAAC BE PROVIDED FOR CONSTRUCTION PROCESSES, QA PROGRAMS - INCLUDING VENDOR QA
INDUSTRY/GE POSITION	TIER 1 IS RESERVED FOR TOP LEVEL ISSUES. PART 52 INVOKES PART 50, INCLUDING APPENDIX B. DETAILED CONSTRUCTION PROCESSES ARE NOT TIER 1 MATERIAL AND SHOULD BE LEFT TO COL CONSTRUCTION PROCEDURES. NRC I&E WILL BE VIA EXISTING PART 50 QA PROGRAMS
NRC POSITION:	NOT CLEAR. GE THOUGHT THIS WAS A RESOLVED ISSUE
PROPOSED RESOLUTION:	UPDATED ABWR TIER 1 TO BE BASED ON EXISTING GE UNDERSTANDING OF PART 50/52 RELATIONSHIP

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	D: TIER 1 ACCEPTANCE CRITERIA SPECIFICITY - HOW MUCH IS NEEDED?
ISSUES(S):	HOW SPECIFIC, MEASURABLE, UNAMBIGUOUS SHOULD THE ACCEPTANCE CRITERIA BE?
INDUSTRY/GE POSITION:	VERY. IT IS ESSENTIAL THERE BE CRISP ACCEPTANCE CRITERIA TO MINIMIZE OPPORTUNITIES FOR SUBJECTIVE INTERPRETATIONS AT THE TIME OF FUEL LOAD
NRC POSITION:	BROADLY STATED ACCEPTANCE CRITERIA ARE OK, PROVIDED THE DETAILS OF HOW THEY ARE TO BE MET ARE INCLUDED IN TIER 2
PROPOSED RESOLUTION:	INDUSTRY: REVISING THE ABWR ITAAC TO MAKE THE ACCEPTANCE CRITERIA VERY SPECIFIC, UNAMBIGUOUS. THIS INVOLVES SOME DELETION OF ITAAC ENTRIES

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM: E: GENERIC ITAAC - THEIR ROLE

ISSUE(S): TO WHAT EXTENT SHOULD TIER 1 INCLUDE GENERIC ITAAC TO COVER SUCH ISSUES AS WELDING AND EQUIPMENT QUALIFICATION?

INDUSTRY/GE POSITION: THESE PROCESSES INVOLVE VERY EXTENSIVE DETAILS AND ARE NOT TIER 1 MATERIAL

- COVERED BY PART 50 PROCESSES
- DETAILS NOT KNOWN AT TIME OF CERTIFICATION
- SPECIFIC ACCEPTANCE CRITERIA CANNOT BE DEFINED AT CERTIFICATION
- NONCOMPLIANCES CAN OFTEN BE SAFELY ACCEPTED

NRC POSITION: TIER 1 ENTRIES ARE NECESSARY FOR IMPORTANT GENERIC ISSUES:

- HISTORICAL DIFFICULTIES
- NOT WELL DEFINED IN CODES AND STANDARDS

PROPOSED RESOLUTION: INDUSTRY: DELETE GENERIC ITEMS ENTIRELY FROM TIER 1

NRC: NEEDS DISCUSSION

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	F: WHICH SYSTEMS TO TREAT IN TIER 1 (AND HOW)
ISSUE(S):	JUST HOW MANY OF THE APPROXIMATELY 140 ABWR SYSTEMS SHOULD BE ADDRESSED IN TIER 1, AND HOW SHOULD THEY BE TREATED?
INDUSTRY/GE POSITION:	SEE NEXT PAGE; GE IS FLEXIBLE ON THIS ISSUE. GE DOES NOT BELIEVE THE RATIONALE FOR SELECTING TIER 1 ENTRIES SHOULD BE INCLUDED IN TIER 1
NRC POSITION:	NO FIRM POSITION, ALTHOUGH THERE IS SOME SENTIMENT IN FAVOR OF OPTION 2 (SEE NEXT PAGE)
PROPOSED RESOLUTION:	GE/NRC INTERACTIONS TO ARRIVE AT A MUTUALLY ACCEPTABLE SYSTEM TREATMENT FOR ABWR RESUBMITTAL. DO NOT INCLUDE SELECTION CRITERIA IN TIER 1

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

TIER 1 TREATMENT OF ABWR SYSTEMS

GE APPROACH TO DATE

- PART 52 PROVIDES NO GUIDANCE ON THIS ISSUE

- USE ABWR PRODUCT STRUCTURE PER SAR TABLE 3.2.-1 (ABOUT 140 SYSTEMS COVERING ALL EQUIPMENT)

- AT LEAST RECOGNIZE EACH SYSTEM IN TIER 1 (STANDARDIZATION)

- CATEGORIZE SYSTEMS A1, A2, A3, B, C, D

- GRADED TREATMENT OF SYSTEMS IN TIER 1
  MIN: SYSTEM NAME ONLY
  MAX: DESIGN DESCRIPTION AND ITAAC TABLE

OPTIONS FOR REVISING TIER 1

1. USE THE CURRENT APPROACH WITH SOME MINOR TUNING
   - A FEW A CATEGORIES COULD BE DOWNGRADED TO B (DECONTAMINATION SYSTEM, STACK SYSTEM)
   - A FEW A, B CATEGORIES COULD BE DOWNGRADED TO C

2. RESTRUCTURE TIER 1 TO INCLUDE ONLY SYSTEMS WITH DD + ITAAC (A1, A2, A3)

3. RESTRUCTURE TIER 1 TO INCLUDE ONLY FORMALLY IDENTIFIED SAFETY-RELATED SYSTEMS (A1)

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Category	Type of System	Example	Bases of Tier 1 Treatment
A1	Safety-related systems that contribute to plant performance during design basis accidents.	High Pressure Core Flooder (2.4.2).	Self-evident. These systems include safety-related equipment that must be addressed in Tier 1. Provide: Design description and ITAAC.
A2	Systems that contribute to plant performance during beyond-design-basis events (severe accidents, ATWS, etc.)	Combustion Turbine Generator (2.12.11).	These systems are related to plant safety and should be addressed in Tier 1. Provide: Design descriptions and ITAAC.
A3	Systems or equipment with some relationship to safety or with significant plant investment protection (PIP) functions.	Turbine Control System overspeed protection function (2.10.7/8).	Tier 1 should at least address aspects of these systems that have some relationship to safety/PIP. Provide: Design description and ITAAC.
B	Important elements of the design with no direct safety significance but with some influence on overall plant design (i.e., arrangement).	Internal Pump maintenance facility (2.5.9).	These systems are significant enough that the overall standardization goal warrants a brief Tier 1 description. Provide: Brief design description; no ITAAC.
C	Non-significant systems with no relationship to safety or influence on basic plant design. This category also includes special case systems such as plant start-up equipment.	Control Rod Drive removal machine control computer (2.2.13) and Plant Start-up Test Equipment (2.5.11).	Tier 1 treatment not necessary. Provide: System name included in system listing, no other Tier 1 entry.

Category	Type of System	Example	Bases of Tier 1 Treatment
D	System for which the necessary Tier 1 treatment has been handled in another system.	Unit Auxiliary Transformer (2.12.2) is covered in Emergency Power Distribution System (2.12.1).	No additional Tier 1 treatment required. Provide: System name included in system listing; no other entry.

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

TIER 1 TREATMENT OF ABWR SYSTEMS
- EXAMPLES OF FINE TUNING

A CATEGORY SYSTEMS WHICH COULD
BE DOWNGRADED TO B CATEGORY

DECONTAMINATION SYSTEM

STACK SYSTEM

CRANE AND HOISTS

BREATHING AIR SYSTEM

OIL STORAGE AND TRANSFER

COMMUNICATION SYSTEM

A, B CATEGORIES OF SYSTEMS WHICH
COULD BE DOWNGRADED TO C CATEGORY

VACUUM SWEEP SYSTEM

REFUELING PLATFORM CONTROL COMPUTER

INSERVICE INSPECTION EQUIPMENT

HEATING STEAM AND CONDENSATE WATER RETURN SYSTEM

HOUSE BOILER

HOT WATER HEATING SYSTEM

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	G: DESIGN DESCRIPTION/ITAAC RELATIONSHIP
ISSUE(S):	TO WHAT EXTENT SHOULD THE ITAAC TABLE ADDRESS ENTRIES IN THE DESIGN DESCRIPTION (DD) - ALL ITEMS - SELECTED ITEMS
INDUSTRY/GE POSITION:	THE ITAAC TABLE DERIVES DIRECTLY FROM THE DESIGN DESCRIPTION BUT IS NOT NECESSARILY ONE-FOR-ONE. USE A SELECTED ITEM APPROACH - SOME ISSUES NEED TO BE CERTIFIED BUT ARE NOT ITAAC CANDIDATES; E.G., SEISMIC CATEGORY OF PIPING
NRC POSITION:	NO FIRM POSITION BUT ISSUE UNDER REVIEW
PROPOSED RESOLUTION:	CONTINUE AS-IS, ABSENT A CLEARLY DEFINED NEED TO CHANGE

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVI[illegible] OF ITEMS LACKING CONSENSUS

ITEM:	H: SCHEDULES AND FDA/TIER 1 COUPLING
ISSUE(S):	A) ARE PROGRAM SCHEDULES TO BE PREDICATED ON FDA/ITAAC COUPLING B) NRC WANTS REVISED/CERTIFIED TIER 1 SUBMITTAL BY SEPTEMBER 30, 1992
INDUSTRY/GE POSITION:	A) SCHEDULES SHOULD (FOR NOW) ASSUME COUPLING, BUT IT IS NOT A REQUIREMENT OF PART 52 (EXCEPT FOR DAC) B) IMPOSSIBLE/UNWARRANTED/COUNTERPRODUCTIVE - NOVEMBER/DECEMBER REALISTIC - THIS SHOULD NOT DELAY FDA SCHEDULE
NRC POSITION:	A) FDA AND TIER 1 REVIEW ARE COUPLED BECAUSE NRC CANNOT MAKE A SAFETY DETERMINATION WITHOUT CERTIFIED TIER 1 B) SEPTEMBER 30, 1992, SUBMITTAL NEEDED TO SUPPORT 12/92 FDA SCHEDULE
PROPOSED RESOLUTION:	REQUIRES DISCUSSION

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ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	I: PROGRAMMATIC TIER 1 ENTRIES
ISSUE(S):	NRC REQUESTS/COMMENTS CALL FOR TIER 1 ENTRIES (DC OR COL) COVERING PROGRAM ISSUES SUCH AS QA, RAP, TRAINING, ITP; AND OTHERS
INDUSTRY/GE POSITION:	GE DOES NOT AGREE THAT PROGRAMMATIC ISSUES ARE LEGITIMATE TIER 1/ITAAC ENTRIES A) TIER 1 SHOULD BE FOCUSED ON HARDWARE ISSUES (DC AND COL) B) PROGRAM ADEQUACY ASSURED THROUGH SAR AND NRC I&E
NRC POSITION:	BASES FOR REQUESTS VARY FROM ITEM TO ITEM BUT DERIVE FROM THE PHILOSOPHY THAT "IMPORTANT THINGS NEED TO BE IN TIER 1"
PROPOSED RESOLUTION:	CONTINUE AS-IS (DELETE ITEM 3.8). TIER 1 TO FOCUS ON HARDWARE ISSUES

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	J: BRIDGE DOCUMENT CONCEPT
ISSUE(S):	VARIOUS NRC COMMENTS CALL FOR A BRIDGE DOCUMENT FROM TIER 1/ITAAC TO PRE-OP TESTS, STARTUP TESTS, AND SYSTEM DRAWINGS
INDUSTRY/GE POSITION:	CONCEPT NOT FULLY UNDERSTOOD, BUT IT IS NOT OBVIOUS THAT ANY BRIDGING MECHANISM IS REQUIRED. SYSTEM DESIGNATIONS PERMIT ENTRY INTO PLANT-DETAILED DESIGN DOCUMENTATION
NRC POSITION:	NOT FULLY UNDERSTOOD BY INDUSTRY
PROPOSED RESOLUTION:	CONTINUE AS-IS ABSENT A CLEARLY DEFINED REQUIREMENT FOR BRIDGE DOCUMENTS

ABWR DESIGN CERTIFICATION
GE/NRC 8/26/92 MEETINGS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	K: ROAD MAPS AND THEIR STATUS
ISSUE(S):	THERE IS AGREEMENT THAT ROAD MAPS LINKING SAR ANALYSES TO ITAAC ENTRIES WILL BE PROVIDED. OPEN ISSUES ARE: A) SUBJECTS TO BE COVERED B) ROAD MAP STATUS
INDUSTRY/GE POSITION:	A) ROAD MAPS WILL BE PROVIDED FOR IMPORTANT SSAR SAFETY ANALYSES (SEE ATTACHED) B) ROAD MAPS ARE INFORMAL AID FOR NRC REVIEW. THEY SHOULD NOT BE INCORPORATED IN EITHER SAR OR TIER 1
NRC POSITION:	A) PRETTY MUCH AGREE WITH THE GE LISTING (SOME FINE-TUNING REQUIRED) B) NOT DEFINED
PROPOSED RESOLUTION:	CONTINUE AS-IS USING THE GE APPROACH

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SUMMARY OF PROPOSED ROAD MAPS

ANALYSIS *	SAR SECTION
CORE COOLING	CHAPTER 6
CONTAINMENT COOLING	CHAPTER 6
TRANSIENTS	CHAPTER 15
RADIOLOGICAL	CHAPTER 15, CHAPTER 19
OVERPRESSURE PROTECTION	CHAPTER 5
FLOODING	CHAPTER 3
FIRE	CHAPTER 9
ATWS	CHAPTER 15
PRA	CHAPTER 19

*DESIGN BASIS AND BEYOND DESIGN BASIS ANALYSES PRESENTED IN THE SAR

ROAD MAP SUMMARY

INTENT OF ROAD MAPS

- IDENTIFY HOW KEY SAFETY ANALYSIS ASSUMPTIONS ARE VERIFIED BY ITAAC
- INTENDED AS AN INFORMAL REVIEW AID; NOT TIER 1 OR TIER 2

EXAMPLES OF ENTRIES

SEE NEXT TWO SHEETS

- CORE COOLING ANALYSES
- FIRE HAZARDS ANALYSIS

Table B.1-1 Analysis Verification Using ITAAC

Core Cooling

SSAR Entry	Parameter	Value	Verifying ITAAC
6.3.3	ECCS Performance Evaluation		
Table 6.3-1	Low Pressure Flooder System		
	Vessel Pressure to Initiate Flow (kg/cm^2d)	15.8	2.4.1
	Rated Flow (m^3/hr per pump)	954	2.4.1
	at Vessel Pressure (kg/cm^2d)	2.8	2.4.1
	Time from Initiating Signal to Pumps at Rated Speed (sec)	29	2.4.1
	Time from Low Pressure Permissive Signal to Injection Valve Fully Open (sec)	36	2.4.1
	Reactor Core Isolation Cooling System		
	Rated Flow (m^3/hr)	182	2.4.4
	at Vessel Pressures (kg/cm^2d)	82.75 to 10.55	2.4.4
	High Pressure Core Flooder System		
	Rated Flows (m^3/hr)	182 and 727	2.4.2
	at Vessel Pressures (kg/cm^2d)	82.75 to 7.0	2.4.2
	Time from Initiating Signal to Injection Valve Fully Open (sec)	36	2.4.2
	Automatic Depressurization System		
	Flow Capacity (kg/hr)	2.903×10^6	2.1.2
	at Vessel Pressure (kg/cm^2g)	79.1	2.1.2
	(Note: The performance of the SRV's defined in ITAAC Table 2.1.2a satisfies these requirements.)		
Table 6.3-4	LOCA Break Sizes		
	Steamline (cm^2)	984.6	2.1.1
	Feedwater Line (cm^2)	838.9	2.1.1
	RHR Shutdown Cooling Suction Line (cm^2)	791.5	2.1.1
	RHR Injection Line (cm^2)	205.3	2.1.1
	High Pressure Core Flooder (cm^2)	92.0	2.1.1
	Bottom head Drain Line (cm^2)	20.25	2.1.1

Table B.1-7 Analysis Verification Using ITAAC

Fire

SSAR Entry	Parameter	Value	Verifying ITAAC
Appendix 9A	Fire Hazard Analysis		
	Normally Inerted Atmosphere	--	2.14.6
	Functions Are Located in a Separate Fire-resistive Enclosure.		
	Reactor Building	--	2.15.10
	Turbine Building	--	2.15.11
	Control Building	--	2.15.12
	Radwaste Building	--	2.15.13
	Service Building	--	2.15.14
	Fire Stops are Provided for Cable Tray and Piping Penetrations Through Fire Rated Barriers		
	Reactor Building	--	2.15.10
	Turbine Building	--	2.15.11
	Control Building	--	2.15.12
	Radwaste Building	--	2.15.13
	Service Building	--	2.15.14
	A Means of Fire Detection, Suppression and Alarming are Provided and Accessible	--	2.15.6

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REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	M: INTERFACE ITAAC SCOPE AND CONTENT
ISSUE(S)	WHAT ARE THE CRITERIA FOR: A) SELECTING SUBJECTS TO BE TREATED BY INTERFACE ITAAC B) DEFINING CONTENTS OF INTERFACE ITAAC
INDUSTRY/GE POSITION:	A) PER 10 CFR PART 52.47(A)(1)(VIII) INTERFACE ITAAC ARE REQUIRED FOR PORTIONS OF THE PLANT OUTSIDE THE SCOPE OF THE CERTIFIED DESIGN; I.E., SITE-SPECIFIC FEATURES B) REVISED GE APPROACH BEING PROPOSED -- SEE ATTACHED
NRC POSITION:	A) CONCUR B) NEEDS TO BE REVIEWED BY NRC
PROPOSED RESOLUTION:	NRC TO REVIEW REVISED GE APPROACH. THIS WILL BE UTILIZED FOR REVISED TIER 1 IF NRC CONCURS

REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	L: TIER 1 TREATMENT OF CODES AND STANDARDS
ISSUE(S):	TO WHAT EXTENT SHOULD CODES AND STANDARDS BE CALLED OUT IN TIER 1?
INDUSTRY/GE POSITION:	A) ITAAC SHOULD IDENTIFY THE CODE; SAR SHOULD IDENTIFY THE VERSION B) TIER 1 REFERENCES TO CODES SHOULD BE MINIMIZED. IF REFERENCED, THE ENTIRE CODE BECOMES TIER 1 -- INAPPROPRIATE
NRC POSITION:	A) AGREE B) NOT AN ISSUE THAT HAS BEEN DISCUSSED
PROPOSED RESOLUTION:	A) CONTINUE AS-IS B) REVISE TIER 1 TO MINIMIZE BROAD COMMITMENTS TO CODES AND STANDARDS AFTER DISCUSSION WITH STAFF

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TREATMENT OF INTERFACE ITAAC

STAGE 3 APPROACH

- SUBJECTS SELECTED ON THE BASIS OF IN/OUT OF SCOPE
- ITAAC CONSISTS OF A TABLE SIMILAR TO SYSTEM ITAAC

PROPOSED REVISION

- COVER THE SAME SUBJECTS BY INTERFACE ITAAC
- LINK THE ITAAC TABLE TO THE FACILITY SPECIFIC SAR (SEE ATTACHED)

RATIONALE

- ACCOMPLISHES OBJECTIVES
- OBJECTIVE ACCEPTANCE CRITERIA
- MORE PRECISE ITAAC FOR THESE ITEMS CAN BE PREPARED AS PART OF COL ITAAC (IF APPROPRIATE.

PROPOSED APPROACH FOR INTERFACE ITAAC

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
________ system has the capability to ________.	Review the facility-specific Safety Analysis Report (SAR) for the ________ system.	The facility-specific SAR commits that the ______ system has the capability to ______.

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REVIEW OF ITEMS LACKING CONSENSUS

ITEM: N: CERTIFICATION OF TIER 1 MATERIAL

ISSUE(S): THE FINAL ABWR TIER 1 MATERIAL MUST BE CERTIFIED; I.E., MUST BE IN FULL COMPLIANCE WITH QA REQUIREMENTS

INDUSTRY/GE POSITION:

A) FULLY AGREE; THE ONLY DEBATE IS TIMING. SEE ENTRY H
B) TIER 1 DESIGN ENTRIES WILL BE VERIFIED AGAINST THE SAR DESIGN
C) TIER 1 ITAAC ENTRIES WILL BE VERIFIED BY ONE-OVER-ONE REVIEW USING KNOWLEDGEABLE PEER

NRC POSITION: EXCEPT FOR TIMING, NO KNOWN AREAS OF DISAGREEMENT

PROPOSED RESOLUTION: AGREE TO SCHEDULES AND DO IT

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REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	O: TEST CONDITIONS AND ALGORITHMS
ISSUE(S):	TO WHAT EXTENT SHOULD ITAAC ENTRIES SPECIFY TEST CONDITIONS, TEST LINEUPS, ALGORITHMS?
INDUSTRY/GE POSITION:	A) THIS TYPE OF INFORMATION IS APPROPRIATE FOR TEST SPECIFICATIONS AND PROCEDURES BUT NOT FOR TIER 1. (FSAR'S DO NOT INCLUDE SUCH INFORMATION) B) THE GE APPROACH HAS BEEN TO DEFINE ITAAC SO THAT THE ACCEPTANCE CRITERIA ARE BASED DIRECTLY ON OBSERVABLE CHARACTERISTICS C) IN GENERAL, ALGORITHMS TO DEFINE HOW OBSERVED DATA CONFIRMS DESIGN BASIS CONDITIONS WOULD BE LENGTHY; E.G., CONTAINMENT VOLUME TO ACCIDENT PRESSURES
NRC POSITION:	DO NOT CONCUR WITH INDUSTRY ITEM A)
PROPOSED RESOLUTION:	NEEDS DISCUSSION AND (PROBABLY) CASE-BY-CASE RESOLUTION

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REVIEW OF ITEMS LACKING CONSENSUS

ITEM: P: I, T, A CONTENT

ISSUE(S): SEVERAL NRC COMMENTS STATE THERE IS AN OVER-RELIANCE ON PROCESS INSPECTIONS (DOCUMENTATION REVIEWS) RATHER THAN TESTING

INDUSTRY/GE POSITION:

A) PROPOSED ITAAC HAVE A BALANCE OF INSPECTIONS, TESTS AND ANALYSES
B) USE OF DOCUMENT INSPECTIONS IS SOMETIMES THE ONLY ALTERNATIVE; E.G., ASME CODE COMPLIANCE
C) NRC SUGGESTIONS FOR TESTS THAT COULD REPLACE INSPECTIONS WOULD BE WELCOME

NRC POSITION: -

PROPOSED RESOLUTION: NEEDS DISCUSSION AND (PROBABLY) CASE-BY-CASE RESOLUTION

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REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	Q: CONSISTENCY AMONG SYSTEMS
ISSUE(S):	A NUMBER OF NRC COMMENTS NOTE THAT THE TIER 1 LEVEL OF DETAIL VARIES FROM SYSTEM (AND IS UNDESIRABLE)
INDUSTRY/GE POSITION:	A) VARIATIONS ARE INTENTIONAL AND REFLECT THE GRADED APPROACH; I.E., LEVEL OF DETAIL DEPENDENT ON SYSTEM'S IMPORTANCE TO SAFETY B) SOME LEGITIMATE INCONSISTENCIES EXIST AND ARE BEING FIXED; E.G., STANDARDIZED TREATMENT OF PIPING CODE COMPLIANCE FOR ALL SAFETY-RELATED PIPING SYSTEMS
NRC POSITION:	GE BELIEVES NRC ACCEPTS THE GRADED CONCEPT
PROPOSED RESOLUTION:	CONTINUE AS-IS (INCLUDING UPDATE TO RESOLVE REAL INCONSISTENCIES)

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REVIEW OF ITEMS LACKING CONSENSUS

ITEM:	R: CROSS REFERENCING
ISSUE(S):	SEVERAL NRC COMMENTS INDICATE INADEQUATE CROSS REFERENCES WITHIN THE ITAAC SECTIONS; I.E., A) SYSTEM TO GENERIC/DAC B) SYSTEM TO SYSTEM
INDUSTRY/GE POSITION:	A) TABLE 3.0 IS INTENDED TO SHOW GENERIC APPLICABILITY B) NOT NECESSARY TO PROVIDE INTERSYSTEM REFERENCES GE BELIEVES CROSS REFERENCING COULD EASILY GET OUT OF HAND AND LEAD TO UNDESIRABLE/UNNECESSARY "CLUTTER." A TYPICAL BWR SYSTEM INTERFACES WITH 5 TO 10 OTHER SYSTEMS, LEADING TO POTENTIALLY 1000+ CROSS REFERENCES. THIS WOULD SERVE LITTLE USEFUL PURPOSE GIVEN THAT TIER 1/ITAAC USERS WILL BE FAMILIAR WITH BWR TECHNOLOGY GE VIEWS THIS AS AN EDITORIAL ISSUE AND COULD/WILL PROVIDE REFERENCES IF THEY ARE VIEWED AS USEFUL
NRC POSITION:	NOT KNOWN, BUT THE TREND APPEARS TO BE IN THE DIRECTION OF MORE CROSS REFERENCING
PROPOSED RESOLUTION:	NEEDS DISCUSSION

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ITEMS LACKING CONSENSUS - SECONDARY LIST

ISSUE	GE APPROACH	NRC POSITION
A. TREATMENT OF NUMBERS	SEE ATTACHED	NOT KNOWN
B. STATUS OF TIER 1 DIAGRAMS	TIER 1 BEING MODIFIED 1) DIAGRAMS DEPICT FUNCTIONAL CONFIGURATIONS 2) DELETE THEIR USE AS BASIS FOR SYSTEM INSPECTION. (USE CERTIFIED DESIGN)	GE BELIEVES CHANGES ARE IN LINE WITH NRC COMMENTS
C. SYSTEM GROUPING (ORDER OF TREATMENT IN TIER 1)	FUNCTIONAL GROUPING PER THE PRODUCT STRUCTURE. MAJOR EFFORT TO RESTRUCTURE; NO SIGNIFICANT BENEFITS	"AS CLOSE TO SAR FORMAT AS POSSIBLE"
D. HOW SHOULD TIER 1 REFLECT POTENTIAL FOR MULTI-UNIT SITES?	DESIGN CERTIFICATION SCOPE IS SINGLE UNIT. ISSUE NOT RELEVANT	DISCUSS HOW MULTIPLE UNIT SITES WILL BE HANDLED

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ITEMS LACKING CONSENSUS - SECONDARY LIST

	ISSUE	GE APPROACH	NRC POSITION
E.	SITE PARAMETER USAGE	TIER 1 TO INCLUDE SITE PARAMETERS AS LISTED IN THE SAR. NO DISCUSSION	AGREE TO LISTING, BUT IN ADDITION, DESCRIBE HOW/WHERE USED AND THE SCOPE OF RE-DESIGN NECESSITATED BY ANY NONCOMPLIANCE
F.	EQUIPMENT IDENTITIES ON TIER 1 SIMPLIFIED DIAGRAMS; E.G., VALVE NUMBERS	NOT PROVIDED AND NOT NECESSARY GIVEN THE INTENT OF THIS DIAGRAM	SEVERAL COMMENTS SUGGEST SUCH DATA SHOULD BE ADDED
G.	HEAT EXCHANGER SITE TESTING	NOT USUALLY IN AN ITAAC BECAUSE SUCH TESTS ARE POST-FUEL LOAD	NOT HAPPY WITH THIS
H.	GENERIC ITAAC FOR MOV AND POWER OPERATED VALVES	NOT MEANINGFUL AS OBJECTIVE ACCEPTANCE CRITERIA REQUIRE AS-BUILT/PROCURED INFORMATION. CRITICAL VALVE ISSUES ARE COVERED IN APPLICABLE SYSTEM ITAAC; E.G., MSIV CLOSURE	THIS TYPE OF GENERIC ITAAC IS NECESSARY

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TIER 1 TREATMENT OF UNITS/NUMBERS

UNITS

METRIC UNITS PER THE (EVENTUAL) SAR

NUMBERS

1. NUMERICAL VALUES TO BE USED IN TIER 1 WILL BE SELECTED CAREFULLY. FACTORS CONSIDERED WHEN SELECTING NUMERICAL VALUES ARE:
   - SAFETY SIGNIFICANCE OF THE PARAMETER
   - STANDARD ENGINEERING PRACTICE AND/OR ACCEPTED BWR PRACTICE WHEN DECIDING ON THE NUMBER OF SIGNIFICANT DIGITS
   - VALUES MUST REFLECT THOSE USED IN THE SAR

2. ALL NUMERICAL VALUES MUST INCLUDE RANGES OR TOLERANCES; E.G.,
   FLOW RATE IS ≥ 4200 GPM
   PRESSURE IS 1280 ±5% PSIG

3. FOR BUILDING DIMENSIONS, THE FOLLOWING APPROACH WILL BE USED.
   A. BUILDING FIGURES WILL INCLUDE KEY DIMENSIONS (NO TOLERANCES). A STATEMENT WILL BE INCLUDED IN THE FRONT OF THE TIER 1 DOCUMENT STATING THESE DIMENSIONS ARE FOR REFERENCE AND ARE TIER 2 INFORMATION.
   B. CRITICAL DIMENSIONS ONLY (E.G., SHEAR WALL THICKNESS) WILL BE INCLUDED IN THE DD TEXT AND ITAAC. TOLERANCES WILL BE INCLUDED FOR THESE TEXT ENTRIES.

4. RATHER THAN USE NON-QUANTIFIED TERMS SUCH AS DESIGN BASIS WIND VELOCITY, THE INTENT IS TO USE THE ACTUAL VALUES; E.G., DESIGNED FOR A WIND VELOCITY OF 300 MPH.