UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 3, 2001

APPLICANT: Westinghouse Electric Company

FACILITY: AP1000 Standard Plant Design

SUBJECT: SUMMARY OF MEETING ON USE OF DESIGN ACCEPTANCE CRITERIA

The subject meeting was held on March 8, 2001, at the US Nuclear Regulatory Commission (NRC) offices in Rockville, Maryland, and was attended by representatives of Westinghouse AP1000 team and NRC staff. Attachment 1 is a list of the meeting attendees and Attachment 2 contains Westinghouse's presentation slides.

The purpose of the meeting was to discuss Westinghouse's proposal to use Design Acceptance Criteria (DAC) in lieu of final design information for seismic analysis, structural and piping design. As part of the AP1000 pre-application review Westinghouse is seeking NRC approval to use DAC The staff noted that there are differences in Westinghouse's proposed use of DAC for AP1000 piping compared to its use in previous evolutionary design certifications and that the proposed use of DAC for seismic and structural design is unique to AP1000. As part of this discussion, Westinghouse committed to resolving DAC at the combined license application stage. The meeting did not discuss Westinghouse's plans to use DAC for other areas such as instrumentation and control or control room design. Westinghouse presentation material and a previously submitted technical report, WCAP 15614, "AP1000 Seismic and Structural Design Activities ML010390194," were used as a basis for the discussions.

The NRC staff advised Westinghouse that:

1. NRC will consider the feasibility of using DAC for wider application than used in previous design certifications applications; and

2. In line with the discussions at the meeting, NRC will request additional information to support this phase of the review.

Jerry Wilson, for

Alan C. Rae
AP1000 Project Manager
Future Licensing Organization
Office of Nuclear Reactor Regulation

Project 711

Attachments: As stated

cc w/atts: See next page

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/RA by J N Wilson for/

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AP1000 Project Manager
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Distribution : See next page

DOCUMENT NAME:G:\RLSB\WILSON\mtg1A Raedoc.wpd *See previous concurrence

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NAME	ACRae	JNWilson	MKGamberoni
DATE	03/ 29/2001	03/29/2001	04/ 3/2001

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NAME	ACRae	JNWilson	MKGamberoni
DATE	03/21/2001	03/21/2001	03/ /2001

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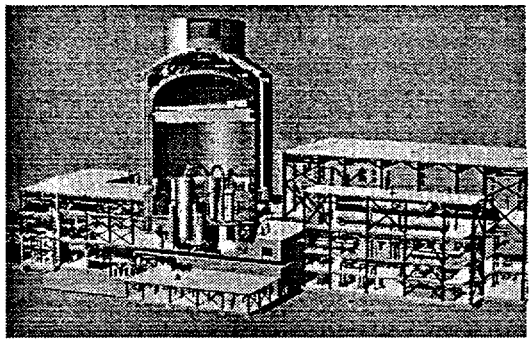
ATTENDANCE LIST
NRC staff meeting with Westinghouse Electric Company
March 3, 2001

NAME	ORGANIZATION
Jerry Wilson	NRC/NRR
Alan Rae	NRC/NRR
David Terao	NRC/NRR
Goutam Bagchi	NRC/NRR
Thomas Cheng	NRC/NRR
Charles Brinkman	Westinghouse Electric Company
Mike Corletti	Westinghouse Electric Company
Richard Orr	Westinghouse Electric Company

Attachment 1



AP1000 Pre-Certification Review

Seismic and Structural Design Activities

March 8, 2001
U.S. Nuclear Regulatory Commission

Outline

- Purpose of meeting
- Structural configuration and changes from AP600 certified design
- AP1000 design certification approach
- Use of design acceptance criteria for detail design by Combined License applicant
  - Seismic analyses
  - Structural design
  - Piping design
- Discussion and conclusions

Purpose of Meeting

- Discuss Westinghouse's proposed approach submitted in WCAP-15614 for design certification of AP1000 seismic and structural design activities.
- Technical data provided in WCAP-15614 is for information only to show the similarity between the AP1000 and the certified AP600. It will be included in the AP1000 DCD and will be subject to NRC technical review at that time.
- Agree on scope in Design Certification, Combined License application, and ITAAC.

AP1000 Approach

- AP1000 DCD will be identical to AP600 DCD except for the specific changes required for the uprate. Changes can be "redlined".
- AP1000 seismic and structural design will not be as complete as for AP600
- AP1000 design will be completed by the Combined License applicant in accordance with the acceptance criteria documented in the DCD

AP1000 Structural Configuration

- AP1000 structural configuration is similar to AP600. Detail design by Combined License applicant will reflect the AP1000 configuration
- AP1000 configuration and differences from AP600 are described in WCAP-15612
- Principal difference is increase in height of containment vessel and shield building

AP1000 vs AP600 Structures

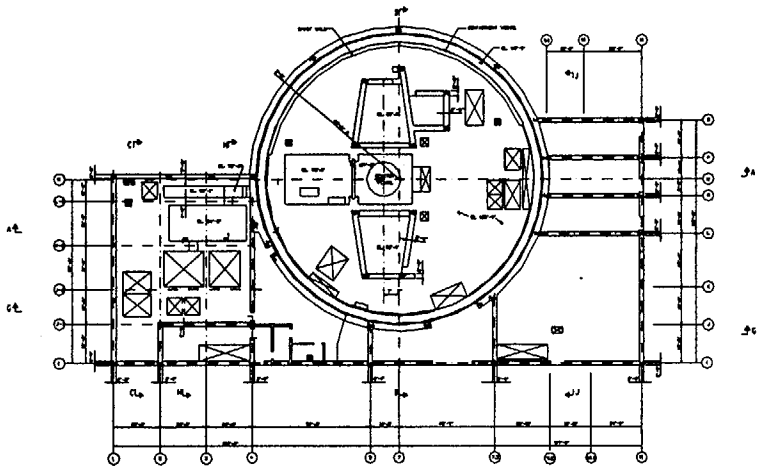
- Shield building raised by 25'6"
- PCS tank capacity increased to 800,000 gal.
- PCS air inlets reconfigured to 12' x 6.5'
- Containment vessel raised by 25'6"
- Polar crane raised and capacity increased
- RCS equipment increased in size
- Steam generator and pressurizer compartment walls raised
- Fuel pit floor elevations lowered by 18.5"

AP1000 Structural Arrangement

Plan at Elevation 135'

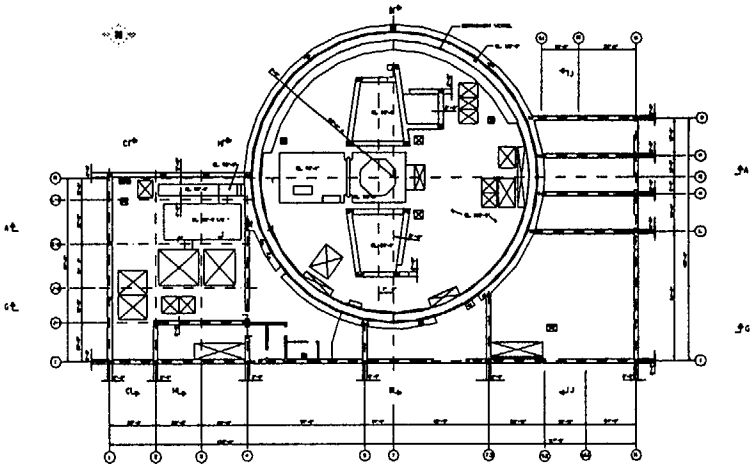
AP600 (as CD)

AP1000



EL. 135'-3"

AP600

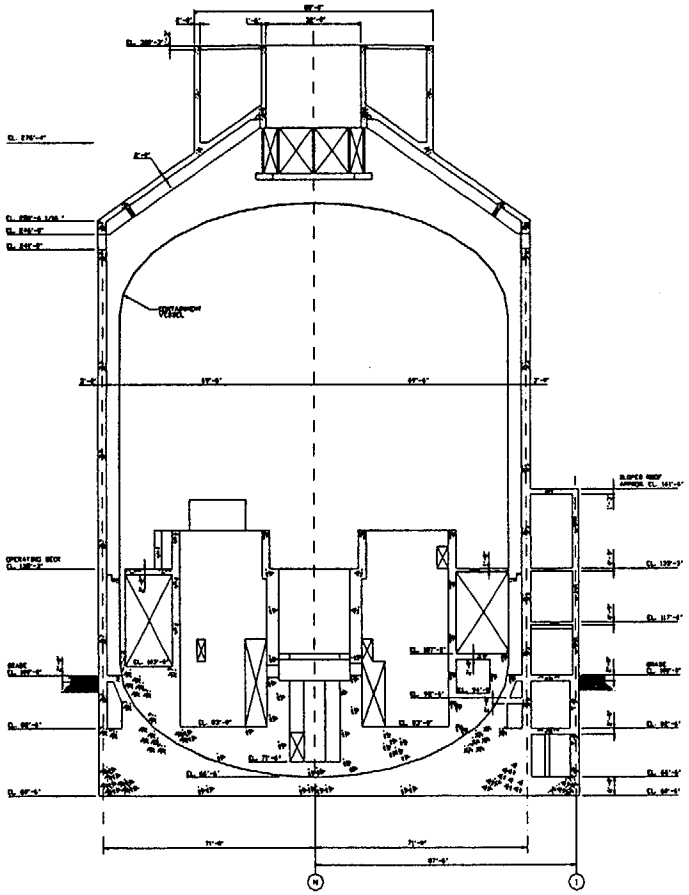


AP1000

AP1000 Structural Arrangement

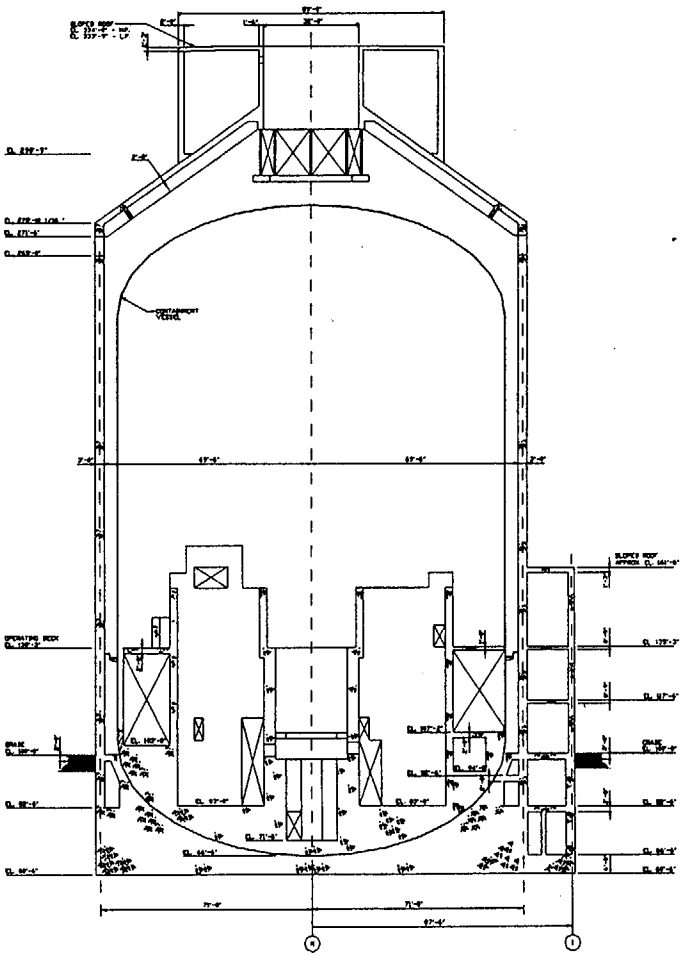
Containment Section View

AP600



AP600

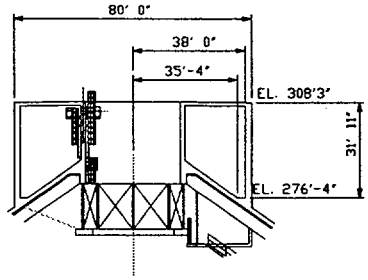
AP1000



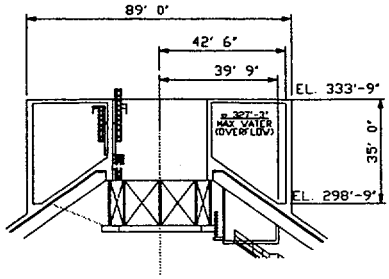
AP1000

PCS Water Storage Tank

AP600



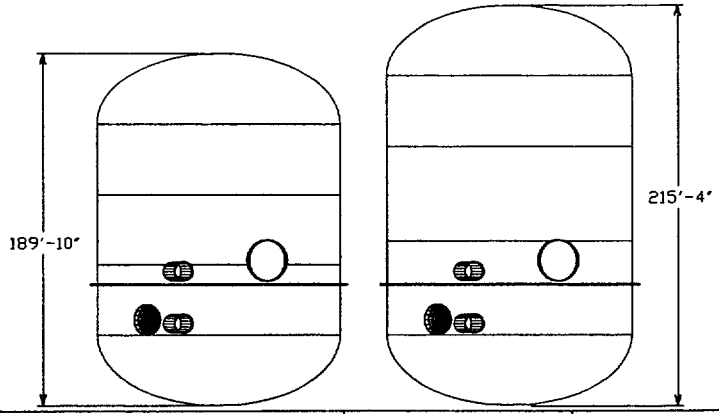
AP1000



- Passive Containment Cooling Water Storage Tank volume increased from 540,000 gallons to 800,000 gallons

Containment Vessel

AP600 AP1000



Parameter	AP600	AP1000
Shell Thickness	1 5/8"	1 ¾"
Total Free Volume, ft^3	1.7×10^6	2.07×10^6
Design Pressure, psig	45	59
Material	A537 Class 2	SA738 Grade B

AP1000 Approach

Scope in Design Certification Document	Scope in Combined License Application	ITAAC/DAC
• Development of stick models for AP1000 • Fixed base seismic analyses of stick models for rock site, including typical results (accelerations, displacements, member forces and floor response spectra) • Overturning and stability for rock site • Preliminary assessment to confirm feasibility of key structural elements with significant increase in load from AP600 • Seismic analysis ITAAC (DAC) at soil sites • Structural design ITAAC (DAC) • Piping design criteria and methodology	• Development of finite element models for AP1000 • If site is not rock, SASSI analysis, including typical results (accelerations, displacements, member forces and floor response spectra) • Overturning and stability • Response spectrum analyses of structures, including soil amplification factor • Structural design, including design reports • Piping analyses for lines qualified for leak before break	• Seismic analyses of soil sites (to be included in Combined License application) • Structural design (to be included in Combined License application) *The following ITAACs are the same as for the AP600* • As-constructed structural and seismic reconciliation • Piping stress reports • Pipe rupture hazard evaluation

AP1000 Approach

- ITAAC/DAC proposed for seismic analyses at soil sites
- Existing AP600 ITAAC for final reconcilation of structures extended to include detailed structural design. This information will be provided by Combined License applicant and reviewed during the combined license review.
- Combined License applicant to provide information on piping analyses and LBB. This will be reviewed during the combined license review.

Seismic Analyses

- AP1000 DCD will include results for hard rock site
- DAC proposed for seismic analyses at soil sites. These analyses would be submitted as part of the Combined License application
- Draft AP1000 DCD subsections 2.5, 3.7.1, 3.7.2, 3.7.5 provided

Seismic Analyses at Soil Sites

Table 3.3-6 Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
Nuclear island soil-structure interaction seismic analyses provide seismic responses for the analysis and design of building structures and seismic subsystems. *Note:* *These seismic analyses are only required when the AP1000 is to be located at a site where the soil below the underside of the base mat has a shear wave velocity less than 3500 feet per second.*	Soil-structure interaction (SSI) analyses of the nuclear island are performed to generate its soil-structure interaction responses. Results include nodal displacements, nodal accelerations, building structure member forces and floor response spectra.	The results of soil structure interaction analyses are documented in a seismic analysis report and summarized in the Combined License application. *Note:* *The seismic analyses at a soil site will be reviewed and accepted by NRC during the Combined License application.*

Seismic Analyses at Soil Sites

- Combined License applicant will select the range of soil conditions. Options include:
  - Soil conditions for his site(s) (best estimate, upper and lower bounds)
  - Envelope soil conditions for his site(s) and hard rock results
  - Envelope soil cases used for AP600 plus demonstrate that they envelope his site
- Structures and equipment will be qualified to results of Combined License applicant's analyses.

Structural Design

- Containment vessel design specification and pressure capacity assessment will be complete and described in DCD
- Structural configuration will be complete and shown on key structural dimension drawings
- Design calculations for reinforcement will be performed by Combined License applicant
- Existing ITAAC covers reconciliation of final design. Design implementation will be included in Combined License review.

Structural Design

Table 3.3-6 Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
The nuclear island structures are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions.	The nuclear island structures will be analyzed for the design basis loads.	Report(s) exist which conclude that the nuclear island structures, including the auxiliary and shield building, the containment internal structures and the nuclear island foundation and base mat, conform to the approved design methodology and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions. This report will be summarized in the Combined License application *Note:The structural report(s) will be reviewed and accepted by NRC during the Combined License application.*

Piping Design

- Piping layouts are similar to AP600
- LBB bounding curves for additional pipe sizes will be included in DCD
- Combined License applicant will demonstrate that piping meets LBB limits at time of Combined License review
- Piping methodology is in DCD and will be documented by ASME design report
- Pipe rupture hazards assessment, including subcompartment pressurization, will described in DCD

Piping Design

Extract from Table 2.1.2-4
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
Table 2.1.2-4 2.b) The piping identified in Table 2.1.2-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.	Inspection will be conducted of the as-built piping as documented in the ASME design reports.	The ASME Code Section III design reports exist for the as-built piping identified in Table 2.1.2-2 as ASME Code Section III.
Table 2.1.2-4 6. Each of the as-built lines identified in Table 2.1.2-2 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.	Inspection will be performed for the existence of an LBB evaluation report or an evaluation report on the protection from dynamic effects of a pipe break. Tier 1 Material, Section 3.3, Nuclear Island Buildings, contains the design descriptions and inspections, tests, analyses, and acceptance criteria for protection from the dynamic effects of pipe rupture.	An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built RCS piping and piping materials, or a pipe break evaluation report exists and concludes that protection from the dynamic effects of a line break is provided.

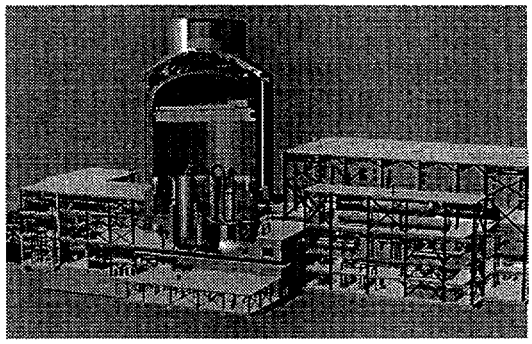
Piping Design

Extract from Table 3.3-6
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
Table 3.3-6 8. Equipment labeled as essential targets in Table 3.3-4 and located in rooms identified in Table 3.3-4 are protected from the dynamic effects of postulated pipe breaks.	An inspection will be performed of the as-built high energy pipe break pipe whip restraints features for systems located in rooms identified in Table 3.3-4.	An as-built Pipe Rupture Hazard Analysis Report exists and concludes that equipment labeled as essential targets in Table 3.3-4 and located in rooms identified in Table 3.3-4 can withstand the effects of postulated pipe rupture without loss of required safety function.

Conclusions

- Design criteria and methodology will be provided in AP1000 DCD and will be similar to AP600 DCD
- Structural configuration, seismic analysis for hard rock and containment vessel will be provided in AP1000 DCD
- Detail design and analysis will be completed by the Combined License applicant and audited by NRC staff during Combined License review
- Final design and reconciliation is covered by ITAAC as used for AP600



AP1000 Pre-Certification Review

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March 8, 2001

U.S. Nuclear Regulatory Commission

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- Technical data provided in WCAP-15614 is for information only to show the similarity between the AP1000 and the certified AP600. It will be included in the AP1000 DCD and will be subject to NRC technical review at that time.
- Agree on scope in Design Certification, Combined License application, and ITAAC.

AP1000 Approach

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- AP1000 seismic and structural design will not be as complete as for AP600
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- Principal difference is increase in height of containment vessel and shield building

AP1000 vs AP600 Structures

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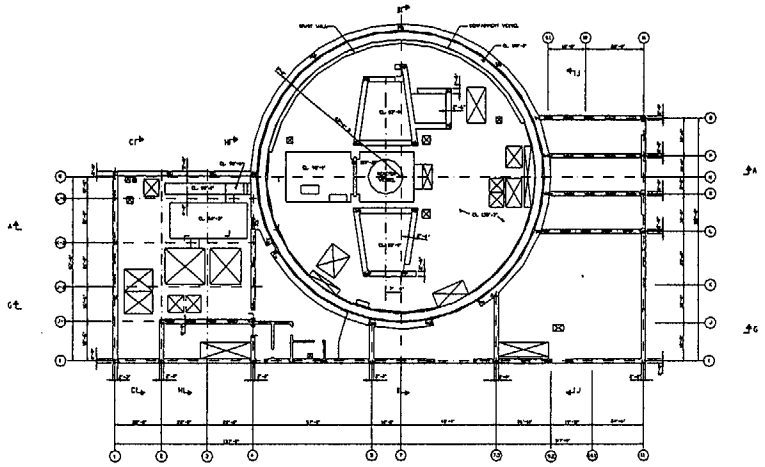
AP1000 Structural Arrangement

Plan at Elevation 135'

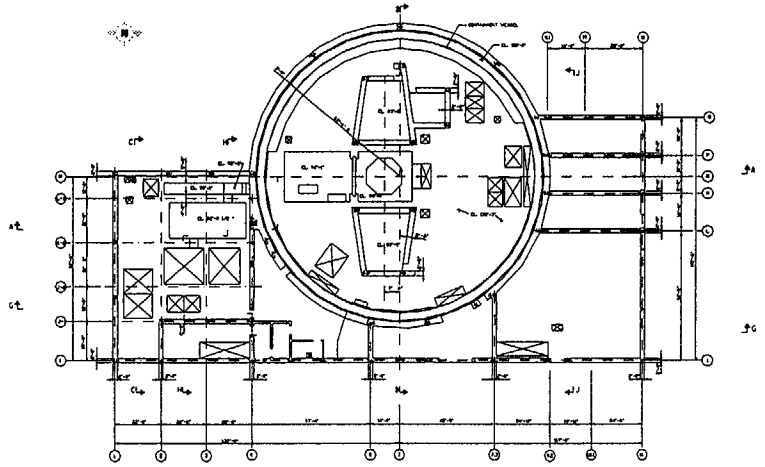
AP600 (as DCD)



AP600

EL. 135'-3"

AP1000

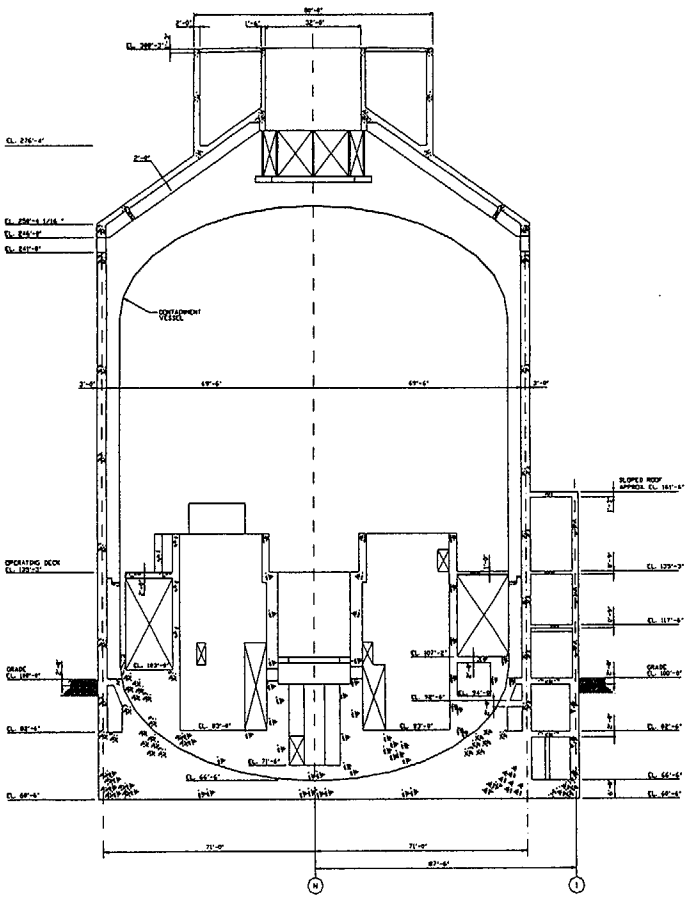


AP1000

AP1000 Structural Arrangement

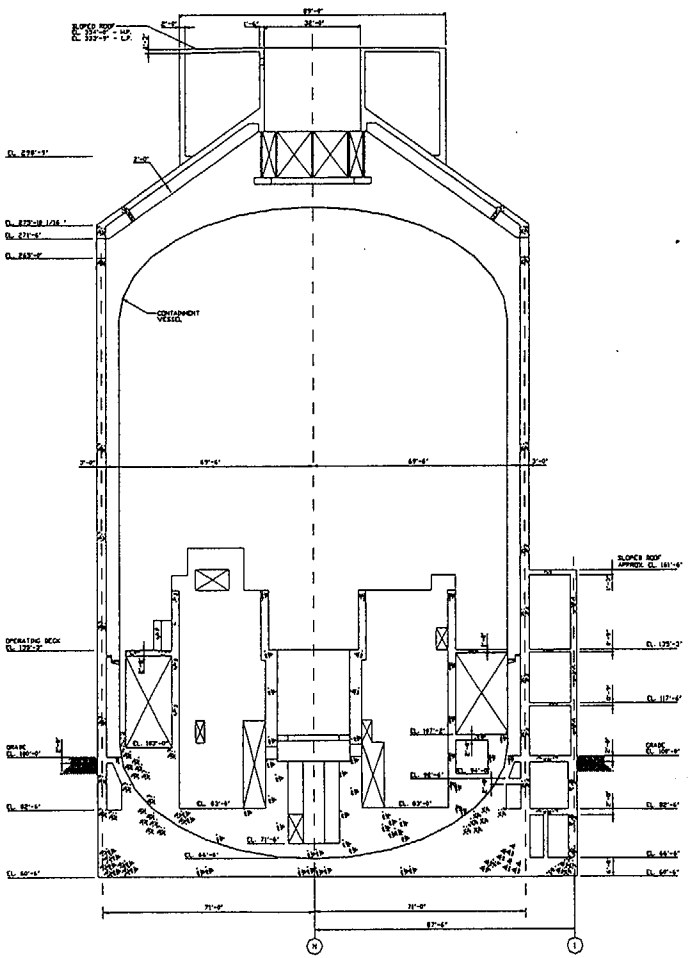
Containment Section View

AP600



AP600

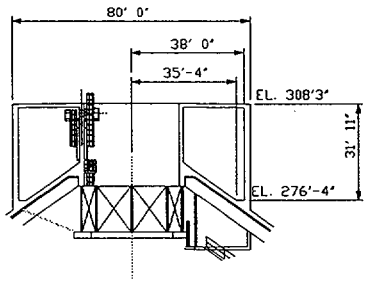
AP1000



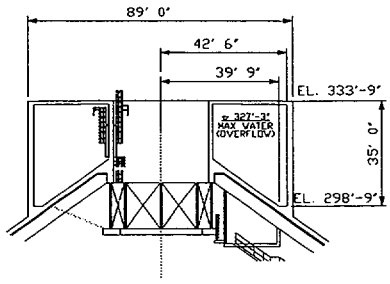
AP1000

PCS Water Storage Tank

AP600



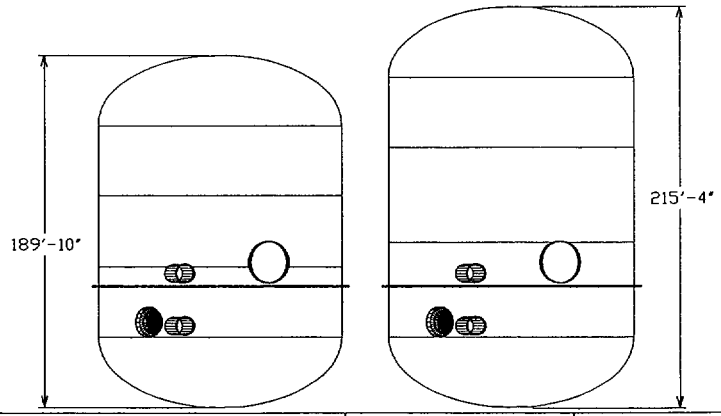
AP1000



- Passive Containment Cooling Water Storage Tank volume increased from 540,000 gallons to 800,000 gallons

Containment Vessel

AP600 AP1000



Parameter	AP600	AP1000
Shell Thickness	1 5/8"	1 ¾"
Total Free Volume, ft^3	$1.7x10^6$	$2.07x10^6$
Design Pressure, psig	45	59
Material	A537 Class 2	SA738 Grade B

AP1000 Approach

Scope in Design Certification Document	Scope in Combined License Application	ITAAC/DAC
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- Existing ITAAC covers reconciliation of final design. Design implementation will be included in Combined License review.

Structural Design

Table 3.3-6 Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
The nuclear island structures are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions.	The nuclear island structures will be analyzed for the design basis loads.	Report(s) exist which conclude that the nuclear island structures, including the auxiliary and shield building, the containment internal structures and the nuclear island foundation and base mat, conform to the approved design methodology and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions. This report will be summarized in the Combined License application *Note:The structural report(s) will be reviewed and accepted by NRC during the Combined License application.*

Piping Design

- Piping layouts are similar to AP600
- LBB bounding curves for additional pipe sizes will be included in DCD
- Combined License applicant will demonstrate that piping meets LBB limits at time of Combined License review
- Piping methodology is in DCD and will be documented by ASME design report
- Pipe rupture hazards assessment, including subcompartment pressurization, will described in DCD

Piping Design

Extract from Table 2.1.2-4
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
Table 2.1.2-4 2.b) The piping identified in Table 2.1.2-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.	Inspection will be conducted of the as-built piping as documented in the ASME design reports.	The ASME Code Section III design reports exist for the as-built piping identified in Table 2.1.2-2 as ASME Code Section III.
Table 2.1.2-4 6. Each of the as-built lines identified in Table 2.1.2-2 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.	Inspection will be performed for the existence of an LBB evaluation report or an evaluation report on the protection from dynamic effects of a pipe break. Tier 1 Material, Section 3.3, Nuclear Island Buildings, contains the design descriptions and inspections, tests, analyses, and acceptance criteria for protection from the dynamic effects of pipe rupture.	An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built RCS piping and piping materials, or a pipe break evaluation report exists and concludes that protection from the dynamic effects of a line break is provided.

Piping Design

Extract from Table 3.3-6
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
Table 3.3-6 8. Equipment labeled as essential targets in Table 3.3-4 and located in rooms identified in Table 3.3-4 are protected from the dynamic effects of postulated pipe breaks.	An inspection will be performed of the as-built high energy pipe break pipe whip restraints features for systems located in rooms identified in Table 3.3-4.	An as-built Pipe Rupture Hazard Analysis Report exists and concludes that equipment labeled as essential targets in Table 3.3-4 and located in rooms identified in Table 3.3-4 can withstand the effects of postulated pipe rupture without loss of required safety function.

Conclusions

- Design criteria and methodology will be provided in AP1000 DCD and will be similar to AP600 DCD
- Structural configuration, seismic analysis for hard rock and containment vessel will be provided in AP1000 DCD
- Detail design and analysis will be completed by the Combined License applicant and audited by NRC staff during Combined License review
- Final design and reconciliation is covered by ITAAC as used for AP600