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

July 21, 2000

APPLICANT: Westinghouse Electric Company

FACILITY: AP1000 Standard Plant Design

SUBJECT: MEETING SUMMARY ON AP1000 PRE-APPLICATION REVIEW

The subject meeting was held on June 5, 2000, at the headquarters of the U.S. Nuclear Regulatory Commission (NRC) between representatives of Westinghouse and the NRC staff. Enclosure 1 is a list of meeting attendees and Enclosure 2 is the meeting agenda. Enclosures 3 and 4 contain the meeting handouts.

The purpose of this meeting was to provide Westinghouse with an opportunity to present the issues that they wanted evaluated during phase two of the pre-application review. I began this meeting with a summary of the NRC's approach to the pre-application review for the AP1000 standard plant design (see Enclosure 3). The remainder of the meeting consisted of presentations by Westinghouse (see Enclosure 4) on the proposed changes to the AP600 design to achieve 1000 MWe and the issues that Westinghouse wants the staff to evaluate. Westinghouse stated that they would be prepared to submit their inputs to phase two in September 2000 and requested the NRC to provide its assessment of phase two by January 2001. We agreed to request a meeting with the Advisory Committee on Reactor Safeguards to review the phase one results during its August 30 - September 1, 2000 meeting.

Jerry N. Wilson, Senior Policy Analyst
License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project No. 711

Enclosures: As stated

cc w/o encls: See next page

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/RA/

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NAME	EHylton	JNWilson	CIGrimes
DATE	07/ /00	07/21 /00	07/21 /00

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Westinghouse Electric Company

cc: Mr. Brian A. McIntyre, Manager
Advanced Plant Safety & Licensing
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230

Mr. H. A. Sepp
Advanced Plant Safety & Licensing
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230

Ms. Lynn Connor
Doc- Search Associates
Post Office Box 34
Cabin John, MD 20818

Ms. Susan Fanto
Advanced Plant Safety & Licensing
Westinghouse Electric Corporation
Energy Systems Business Unit
P.O. Box 355
Pittsburgh, PA 15230

Mr. Jack Bastin
Westinghouse Electric Company
11921 Rockville Pike
Suite 107
Rockville, MD 20852

Barton Z. Cowan, Esq.
Eckert Seamans Cherin & Mellott
600 Grant Street 42nd Floor
Pittsburgh, PA 15219

Mr. Charles Thompson, Program Manager
AP600 Certification
NE-50
19901 Germantown Road
Germantown, MD 20874

Mr. Ed Rodwell, Manager
PWR Design Certification
Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, CA 94303

AP1000 PRE-APPLICATION REVIEW
ATTENDANCE LIST
JUNE 5, 2000

NAME	ORGANIZATION
JERRY WILSON	NRC/NRR/DRIP/RLSB
EDWARD THROM	NRC/NRR/DSSA/SPSB
MICHAEL SNODDERLY	NRC/NRR/DSSA/SPSB
ED CUMMINS	W
SELIM SANCAKTAR	W
MIKE CORLETTI	W
WILLIAM BROWN	W
CHARLES BRINKMAN	W
TERRY SCHULZ	W
JIM SCOBEL	W
MIKE SCHOPPMAN	NEI
CHENG-YANG LI	NRC/NRR/DSSA/SPLB
FRANK AKSTEWLEWICZ	NRC/NRR/DSS/SRXB
RICHARD LOBEL	NRC/NRR/DSSA/SPLB
JOHN LEHNING	NRC/NRR/DSSA/SPLB
GEORGE HUBBARD	NRC/NRR/DSSA/SPLB
THOMAS CHENG	NRC/NRR/DE/EMEB
ROBERT ROTHMAN	NRC/NRR/DE/EMEB
JOE SHEA	OEDO
JOHN FLACK	NRC/RES/SMSAB
JENNIFER WHLE	NRC/RES/SMSAB
RALPH LANDRY	NRC/NRR/DSSA/SRXB
Y. GENE HSII	NRC/NRR/DSSA/SRXB
FAROUK ELTAWILA	NRC/RES/DSARE
J. H. RAVAL	NRC/NRR/DSSA/SPLB
HAROLD WALKER	NRC/NRR/DSSA/SPLB
ANDREW MURPHY	NRC/RES/DET/ERAB
DAVID BESSETTE	NRC/RES/DSARE/SMSAB
BOB PALLA	NRC/NRR/DSSA/SPSB
GOUTAM BAGCHI	NRC/NRR/DE
NICK SALTOS	NRC/NRR/DSSA/SPSB
NOEL DUDLEY	ACRS
RONALD YOUNG	NRC/NRR/DSSA/SPLB

Agenda

• Purpose of the Meeting	J. Wilson	1:00
• Introduction	E. Cummins	1:15
• AP1000 Overview	M. Corletti	1:30
• W Proposal for Phase 2 Review		
• Scope of Review	M. Corletti	2:15
• COL Items		
• Analysis Plan & Scaling Assessment	W. Brown	2:30
• AP1000 PRA	S.Sancaktar	3:30
• Summary of Proposal & Feedback	M. Corletti	4:00

Enclosure 2

AP1000 PRE-APPLICATION REVIEW

Purpose: To determine the scope of the AP1000 design certification review.

Phase I: [DE, DSSA, RES]

- Identify the review assumptions and policy issues that need to be evaluated in Phase II.
- Identify the information that NRC will need to evaluate these assumptions and issues.
- Estimate the schedule and resources needed to perform the Phase II review.
- NRC issues letter report on Phase I.

Phase II: [NRR & RES]

- Determine the scope of the AP1000 design certification review.
- Estimate the schedule and resources needed to perform the Phase III review.
- ACRS review of Phase I and Phase II results.
- Request Commission approval of Phase II evaluation (SECY paper).

Phase III: Perform design certification review.

Enclosure 3

AP1000 Pre-Application Review

Westinghouse Electric Company
June 5, 2000

Agenda

• Purpose of the Meeting	J. Wilson	1:00
• Introduction	E. Cummins	1:15
• AP1000 Overview	M. Corletti	1:30
• W Proposal for Phase 2 Review		
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AP1000 Overview

Mike Corletti

Westinghouse Electric Company
June 5, 2000

Introduction

- AP600 meets industry objectives defined in EPRI ALWR Utility Requirements Document
- Electric generation environment has significantly changed over last decade
  - Target generation cost < $0.03 $/kwh
- This motivated W to consider major uprate alternatives
  - Technical feasibility for AP1000 is established
  - Exploring licensing feasibility

AP600 Major Uprate - Objectives

- Increase Plant Power Rating to Reduce Cost
  - Obtain a capital cost that can compete in U.S. market $900-1000/KW for n^{th} twin plant
- Retain AP600 Objectives and Design Detail
- Retain AP600 Licensing Basis
- Retain AP600 Risk Basis

AP600 Major Uprate

- Design Approach
  - Increase the capability/capacity within "space constraints" of AP600
  - Meet regulatory requirements
  - Retain credibility of "proven components"
  - Retain AP600 plant design (footprint)
  - Retain the basis for the cost estimate, construction schedule and modularization scheme

Comparison of Selected Parameters

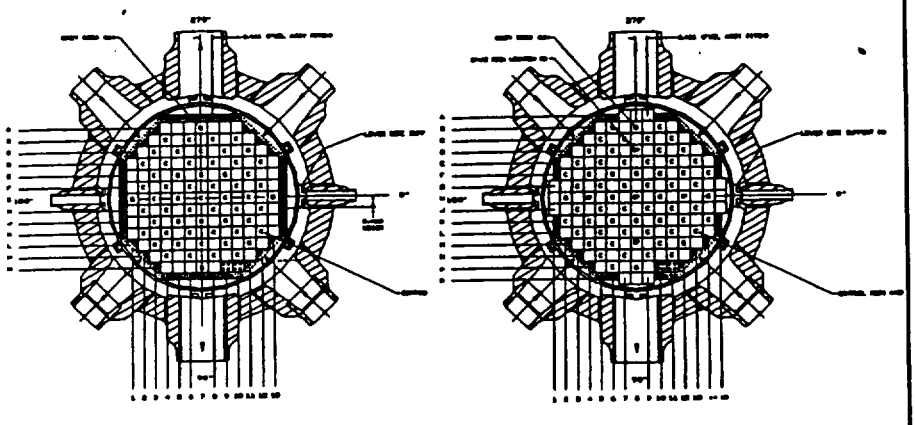
PARAMETER	AP600	AP1000
Net Electric Output, MWe	600	> 1000
Reactor Power, MWt	1933	2993
Hot leg temperature, °F	600	615
Number of Fuel Assemblies	145	157
Type of Fuel Assembly	17x17	17x17
Active Fuel Length, ft.	12	14
Core Loading, MTU	66.90	84.50
Linear Heat Rating, kw/ft	4.10 (13.5 kw/m)	5.03 (16.6 kw/m)
Average Power Density, kw/liter	78.82	96.6
R/V I.D., inches	157 (3988 mm)	157 (3988 mm)
Steam Generator	Δ75	Δ125
Reactor Coolant Pump Flow, gpm	51,000	65,000
Pressurizer, ft^3	1600	1800

AP600 Major Uprate to 1000 MWe

- Select proven core design
  - Doel 3, Tihange 4
    - 3000 MWt
    - 14 ft active fuel length; 17x17 fuel
    - 157 fuel assemblies
- Size Key NSSS components
  - Reactor Vessel/Head - 3-Loop with reflector
  - Steam Generator - Δ125 similar to ANO replacement
  - Reactor Coolant Pump - increase capacity
  - Pressurizer - increase volume

Core Design

AP600 AP1000



- Number of Fuel Assemblies Increased from 145 to 157
- Active fuel length increased from 12 ft to 14 ft

Reactor Coolant Loop Deisgn

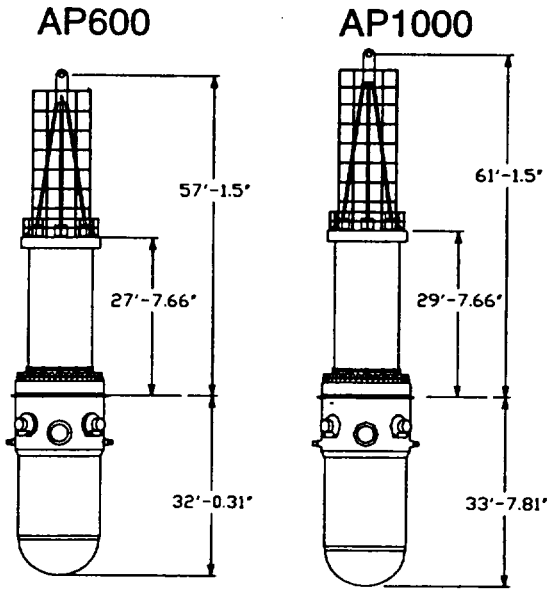
- Same design as AP600
  - Elevations of hot leg and cold leg piping maintained
    - Reactor vessel thermal center lowered
    - Steam generator thermal center raised
  - Pipe sizes are the same as AP600
  - Surge line design is the same as AP600

Reactor Vessel Design Overview

- Reactor vessel
  - Maintains key AP600 design features
  - No bottom-mounted instrumentation
  - 60 year design life
  - Longer to accommodate longer fuel assemblies
- Lower internals
  - AP600-type internals
  - Lower core support plate thickness increased to accommodate heavier fuel
- Radial reflector
  - Modified to permit additional fuel assemblies
  - Tsuruga 3/4 radial reflector "lessons-learned"
- Integrated Head Package
  - Modified to accommodate longer fuel

Reactor Vessel

with Integrated Head Package

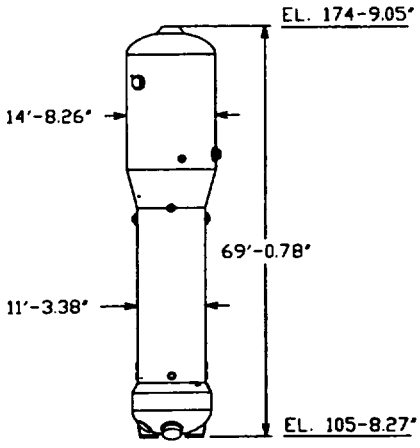


Steam Generator Design

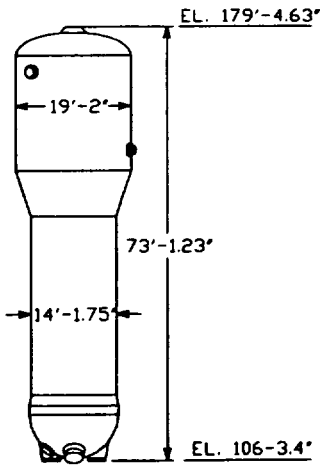
- AP1000 Δ125 Steam Generator
  - Based on Westinghouse proven designs
    - ANO (Arkansas) Replacement SG
      - 1500 MWt per SG
      - Inconel 690 thermally treated tubes

Steam Generator

AP600



AP1000

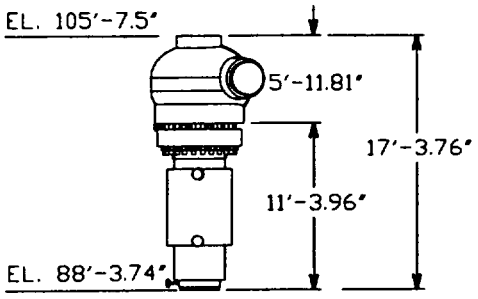


Reactor Coolant Pump

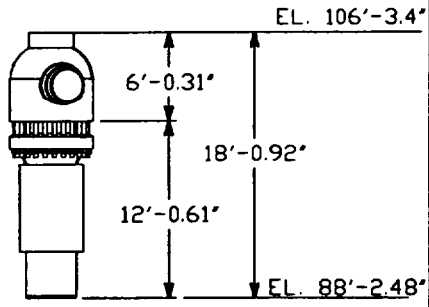
- AP600 RCP based on proven motor design
- Increase capacity for AP1000
  - AP1000 higher power density core requires longer flow coast down - more pump inertia
  - Pump flow requirements increased to accommodate higher core power
- Impacts to pump design minimized
  - Use motor rating at hot coolant condition
  - Variable speed controller added to reduce motor power in cold coolant conditions
  - Use high-efficiency hydraulics - scaled from Tsuruga 3/4
  - Canned motor similar to AP600 size

Reactor Coolant Pump

AP600



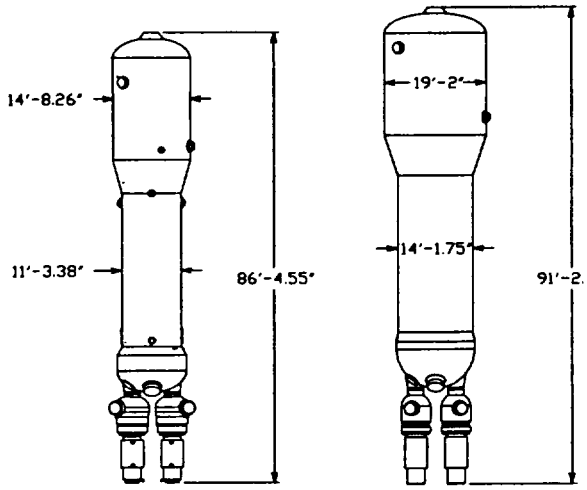
AP1000



Parameter	AP600	AP1000
Design Flow, gpm	51,000	65,000
Design Head, ft	240	275
Rotating Inertia, lb-ft^2	5,000	10,000
Motor Rating, Hp	3200	4000

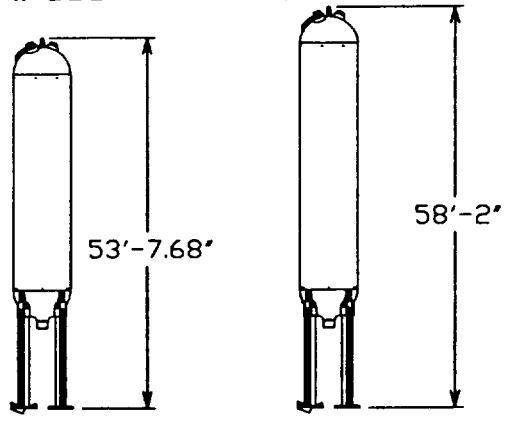
Steam Generator and Pump

AP600 AP1000



Pressurizer

AP600 AP1000



- Pressurizer volume increased from 1600 ft^3 to 1800 ft^3 which is the same size as most 4-loop Westinghouse PWRs.

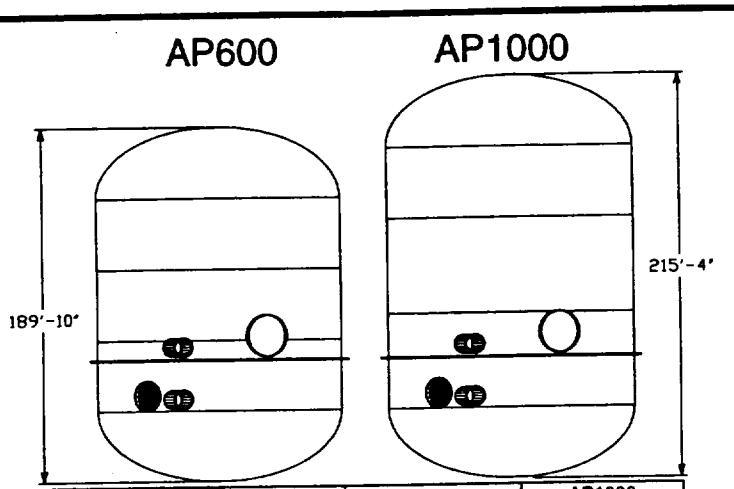
Safety System Assessments Completed

- Containment and PCS cooling
  - Containment volume increased
  - PCS capacity increased
- Passive decay heat removal
  - Passive RHR heat exchanger unchanged
  - System flow rate capacity increased
    - Increase inlet and outlet pipe size
- Passive safety injection
  - Major components unchanged
    - Accumulators / Core makeup tanks / IRWST unchanged
  - ADS capacity increased
    - Stages 1-3 unchanged; Stage 4 line sizes increased
  - Injection piping sizes sizes increased
    - IRWST injection; sump injection

AP1000 Containment Analysis

- Determine Required Containment Volume
  - Limiting events
    - Main steam line break
    - Loss of coolant accident
      - Margin to design pressure increased
  - Containment vessel design changes
    - Height increased 25'-6" (20% increase in volume)
    - Containment Design Pressure Increased to 59 psig
      - Thickness increased from 1.625" to 1.75"
        - 7.7% Increase in design pressure
      - ASME Code 1999 Addenda
        - 14% increase in allowable stress
      - ASME Code Case for SA738 Grade B material
        - 6% increase in allowable stress

Containment Vessel



Parameter	AP600	AP1000
Shell Thickness	1 5/8"	1 ¾"
Total Free Volume, ft³	1.7×10^6	2.037×10^6
Design Pressure, psig	45	59
Material	A537 Class 2	SA738 Grade B

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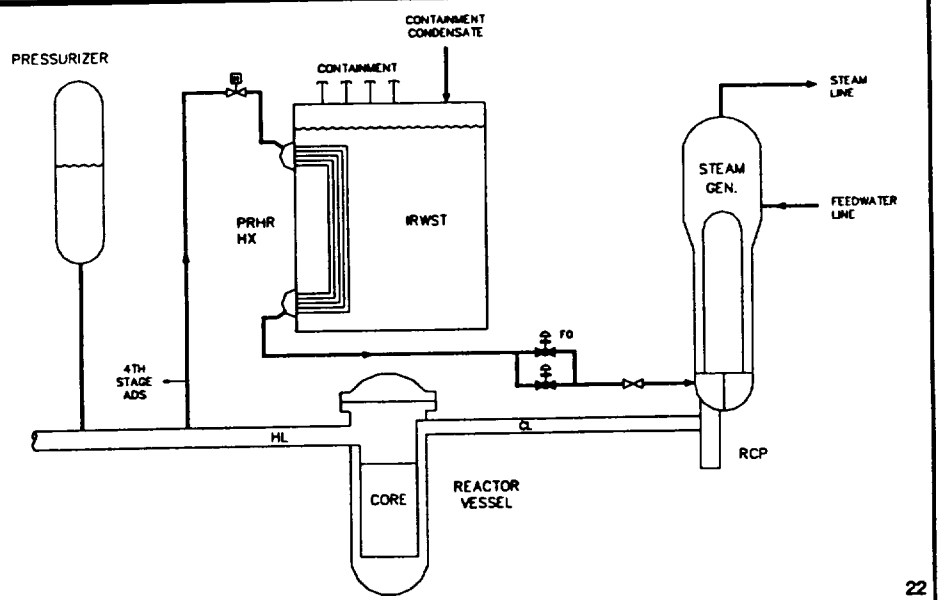
Passive Decay Heat Removal



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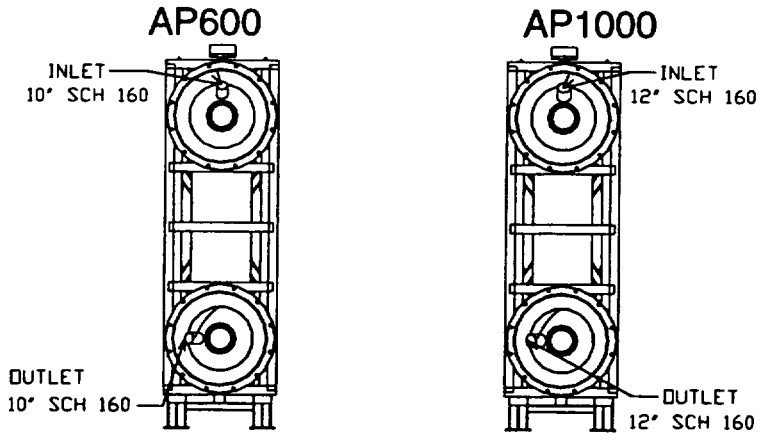
AP1000 Non-LOCA Analysis

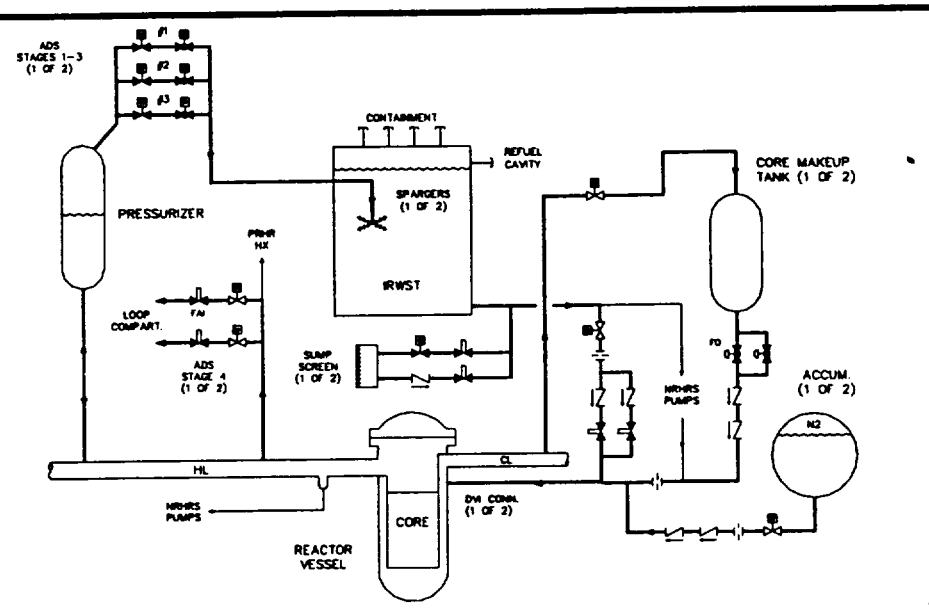
- DNB Assessment
  - Loss of flow evaluations performed to determine required pump rotating inertia
  - Results indicate feasibility of proposed parameters
- Transient Analysis
  - Events analyzed to confirm passive RHR heat exchanger configuration
    - Loss of normal feedwater
    - Feedline break
  - Results indicate AP600 PRHR HX / IRWST configuration acceptable
    - Increase inlet and outlet pipe size to increase PRHR flow

Passive RHR Heat Exchanger



- PRHR HX design unchanged. Piping increased for higher flow rate

AP1000 Passive Safety Injection

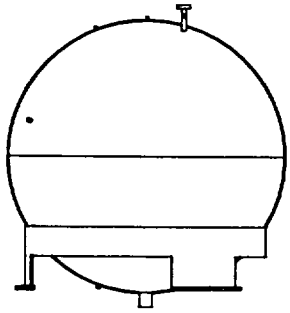


LOCA Analysis

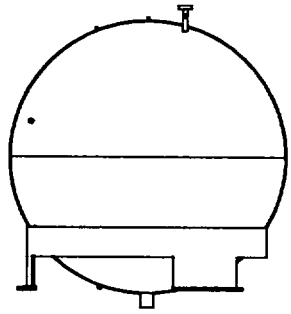
- Large break LOCA assessment
  - Peak clad temperature << licensing limit
  - AP600 accumulator design maintained
  - Increase accumulator flow rate via change to flow orifice
  - AP600 core makeup tank design maintained
- Small break LOCA assessment
  - NOTRUMP analysis for AP1000
    - Assess ADS and IRWST injection capacity
  - COBRA-TRAC long-term cooling analysis
    - Assess ADS 4th Stage and containment recirculation capacity

Accumulators

AP600



AP1000



- Accumulator volume is 2000 ft^3 for both plant designs. AP1000 discharge line flow orifice resized to increase flow rate.

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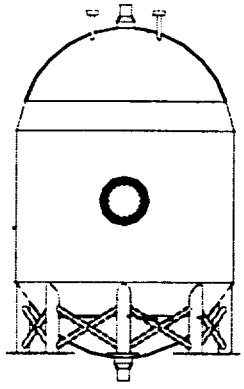
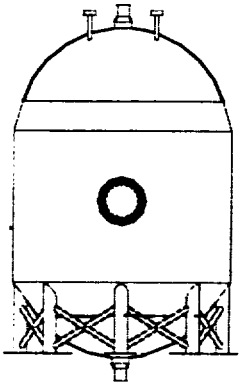
Core Makeup Tanks

AP600



AP1000



- Core Makeup Tank volume is 2000 ft^3 for both plant designs. No changes required.

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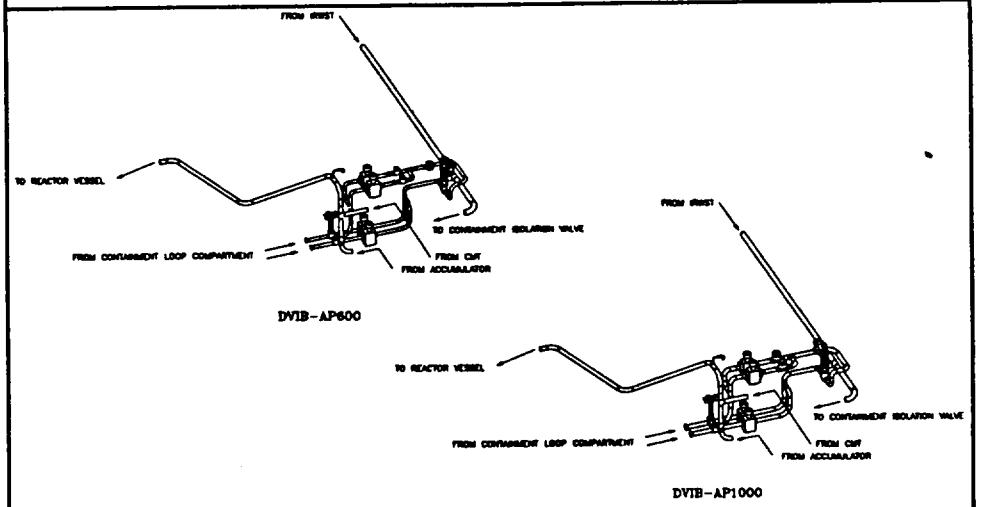
Comparison of DVI Line



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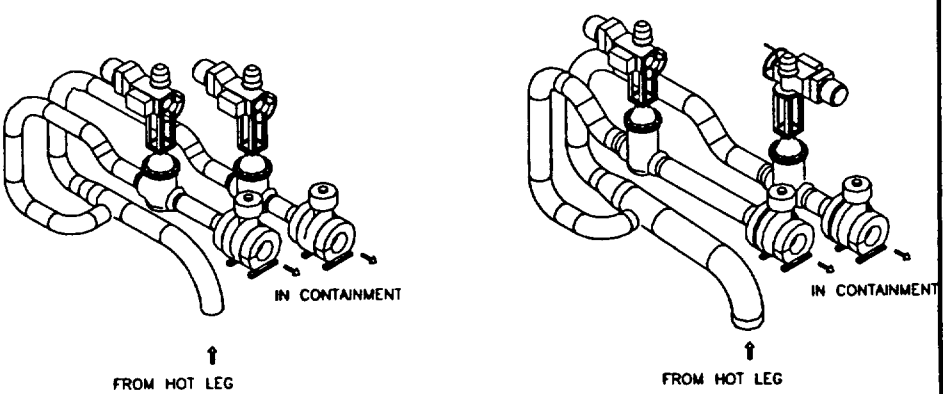
Comparison of 4th Stage ADS

ADS 4 STAGE – AP600 ADS 4 STAGE – AP1000



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AP1000 Safety Margin

- Regulatory requirements ensure safety margin
  - AP1000 will meet all regulatory limits
- AP600 passive safety systems provide additional margin to regulatory limits
  - AP1000 passive safety systems will also provide additional margin
  - Margin management not always straight-forward
    - Competing effects - for example:
      - Higher SG secondary mass
        - Benefit to RCS overpressure protection
        - Penalty to containment design
    - AP1000 safety analysis will demonstrate acceptable margin

Expected AP1000 Safety Margins

	Typical Plant	*AP600*	*AP1000*
Loss of Flow Margin to DNB Limit	~ 1 - 5%	15%	15%
Feedline Break Subcooling Margin	~30 °F	~150 °F	~100 °F
SG Tube Rupture	Operator actions required in 10 min.	Operator actions NOT required	Same as AP600
Small LOCA	3" Break Core uncovers PCT~1500 °F	≤ 8" Break No core uncovery	Same as AP600
Large LOCA (no uncertainties)	PCT ~ 2200°F	PCT ≤ 1400 °F	PCT ~ 1500 °F
Containment Pressurization Margin vs Design Pressure (LOCA)	~1.0 psi	HLB - 5.4 psi CLB - 1.6 psi	> AP600

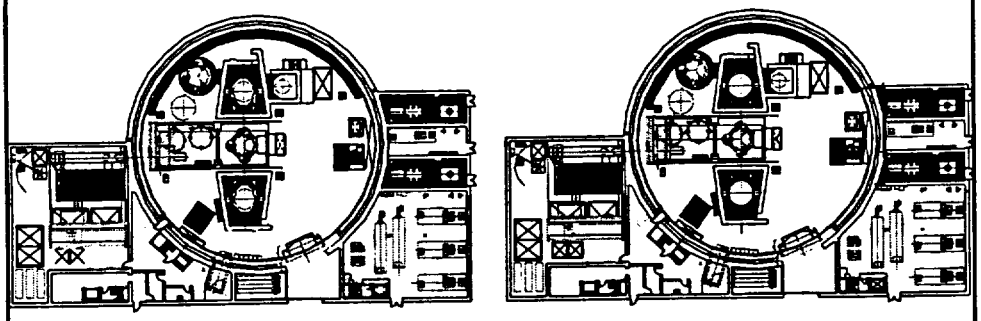
AP1000 Balance of Plant

- Power Generation Systems
  - Main steam line size increased
    - Same size as ANO
  - Feedwater system capacity increased
  - Turbine Island component sizing
    - Heat balance completed
    - AP600 T/G configuration is retained
      - Changes to MSR, condenser, feedwater heaters
- NSSS Auxiliary Systems
  - Small impact to cooling water systems
    - Design configuration maintained
      - RNS / CCW / SFS / SWS / CVS

AP1000 General Arrangement

Plan at Elevation 135'

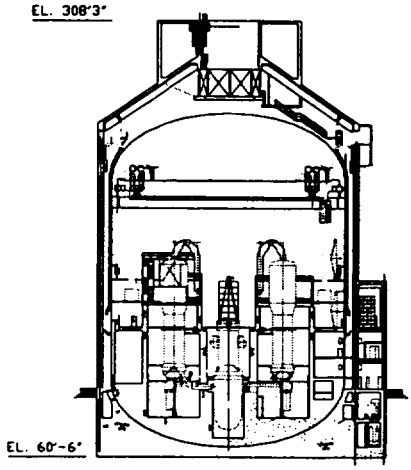
AP600 AP1000



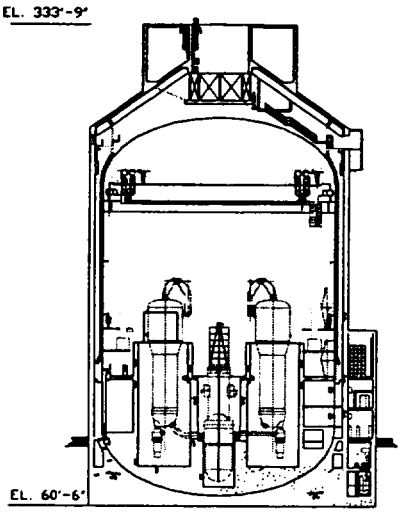
AP1000 General Arrangement

Containment Section View

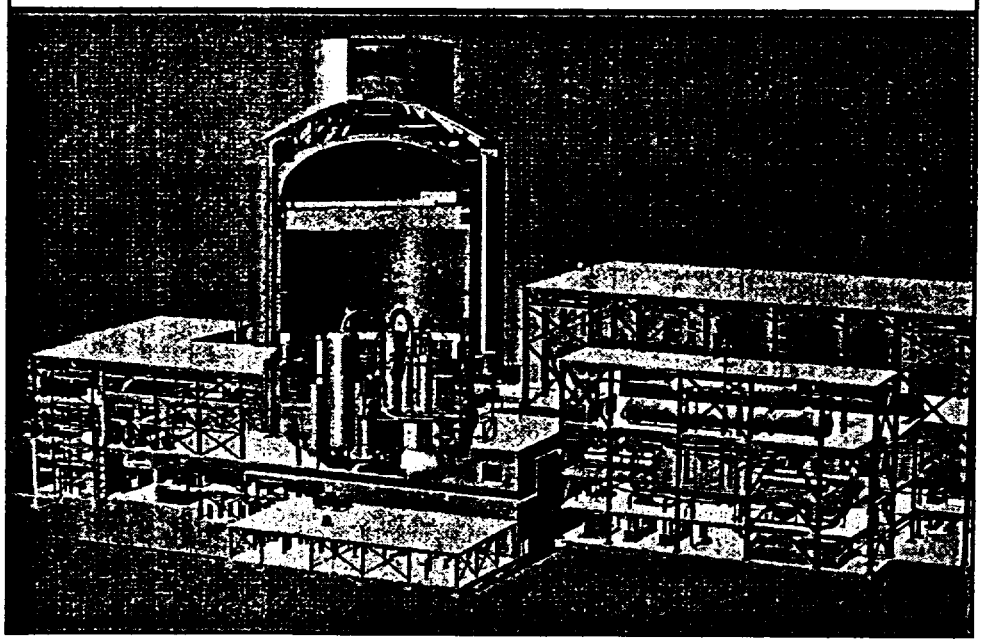
AP600



AP1000



AP1000 - 3D Model



Proposal for Pre-Application Review

Summary of NRC Meeting - 4/27/00

- Meeting held with NRC staff & management
  - W proposed approach to license AP1000
    - Leverage AP600 Design Certification
      - Retain 80% of licensing basis
      - Use same industry codes and standards as AP600
        - Exceptions will be delineated
    - No new Westinghouse certification tests
      - AP600 tests provide sufficient data for licensing AP1000
    - Use Westinghouse AP600 computer codes
      - No re-validation of codes
      - Use AP600 insights with regard to limiting events, combination of failures, etc. to establish Chapter 15 analysis scope
    - Retain AP600 PRA as basis for AP1000
      - Demonstrate similar results with sensitivity study approach
    - Defer selected design activities to COL
      - Use design criteria approach employed by other standard designs

AP1000 Licensing Approach

- NRC proposed 3-phase approach
  - Phase 1 - Scoping estimate
    - Determine high-risk items to evaluate in Phase 2
    - Determine cost / schedule for Phase 2
    - NRC committed to complete by 7/14
  - Phase 2 - Feasibility Issues
    - Assess feasibility issues to enable NRC staff to reach conclusion on W proposed approach
    - Determine cost / schedule for Phase 3
    - Target completion date - 1/2001
  - Phase 3 - Design Certification
    - Review W application based on agreed upon approach

W Proposal for Phase Two

- Agree on 5 Fundamental Assumptions:
  - AP1000 can reference AP600 DCD without NRC review in areas that are unchanged (except to verify section is unchanged)
    - Scope of NRC review required for Design Certification
  - AP600 tests are sufficient for AP1000
    - No new tests required to be performed by W
  - AP600 analysis codes are sufficient for AP1000
  - AP600 PRA can form the basis for AP1000
    - Scope of PRA review required for Design Certification
  - AP1000 Approach to level of design detail is acceptable
- ACRS Review & Approval
- Cost / Schedule for AP1000 Design Certification Review

Item 1 - Scope of NRC Review

- Initial Assessment of AP600 DCD Completed
  - Determine scope of changes for AP1000
  - All 18 chapters reviewed - 82% "unchanged"
    - Approximately 800 subsections reviewed
      - 51% of subsections unchanged
      - 31% of subsections require only a change in plant name
        - AP600 -> AP1000
      - 10% of subsections require more significant text changes
        - system descriptions / figures revised
        - no analysis / calculations required
      - 6% of subsections require significant changes including analytical results
      - 2 % of subsections withdrawn
    - PRA not considered
      - Additional PRA study will be provided

Item 1 - Scope of NRC Review

- *The AP1000 Design Certification Application will reference sections of the AP600 Design Control Document (DCD) that do not change for the AP1000.*

- W Deliverable:
  - AP1000 Design Control Document Table of Contents delineating the sections that change from AP600

- W Expectation:
  - Determination of the sections of the DCD that can be retained from the AP600 DCD that will not be subject to re-review
  - NRC agreement that corresponding portions of NUREG-1512, "Final Safety Evaluation Report Related to Certification of the AP600 Standard Design" will not change materially

Item 5 - Additional COL Items

- Seismic Design and Structural Analysis
  - Methodology and acceptance criteria identical to AP600
    - Results of seismic analyses to be submitted by COL Applicant
      - (DCD Section 3.7.2)
    - Results of structural design to be submitted by COL Applicant
      - (DCD Section 3.8)
    - Determine scope of structural design feasibility issues to be assessed during Design Certification

      Containment vessel — Nuclear island basemat

      Shield building roof — Nuclear island stability
- Piping Analysis
  - Methodology and acceptance criteria identical to AP600
    - Results of piping analyses to be submitted by COL Applicant

Item 5 - Additional COL Items

- *The AP1000 Design Certification Application can defer selected design activities to the COL applicant.*
  - Seismic Analysis; Structural Design; Piping Design
- W Deliverables:
  - Draft DCD Sections 2, 3.6, 3.7, 3.8, and 3.9 including the seismic analysis for hard rock.
    - Drafts will be markups of the AP600 SSAR showing changes in strike out / redline format.
    - It is expected that these sections would be nearly final. The changes from AP600 would primarily be items deferred to the COL applicant.
- W Expectations:
  - NRC concurrence with the level of detail to be included in the AP1000 application
  - NRC agreement on scope and content of new COL commitments

AP1000
Analysis Plan and Scaling Assessment of AP600 Test Program

W. L. Brown
Westinghouse Electric Company

AP1000 Approach to Safety Analysis

- Use NRC-approved AP600 computer codes
  - LOFTRAN: Transients
  - NOTRUMP: SBLOCA
  - W COBRA-TRAC: LBLOCA
  - W GOTHIC: Containment
  - Use AP600 insights with regard to limiting events, combination of failures, etc. to establish Chapter 15 analysis scope
- Revalidation of codes for AP1000 not required
  - Basic phenomena same as AP600
  - Applicability of test program to AP1000 will be addressed:
    - Revalidate Phenomena Identification and Ranking Table (PIRT)
    - Check that High-Ranked PIRT phenomena are adequately scaled using same criteria as for AP600
  - No additional tests required

Primary Goal of Analysis Plan/Scaling Assessment

- Provide sufficient information in AP1000 Analysis Plan and Scaling Assessment of AP600 Test Program Deliverable to support decision by NRC/ACRS regarding:
  - Item 2: The AP1000 Design Certification Application will not require additional tests to be performed by the applicant.
  - Item 3: The AP1000 Design Certification Application can utilize the AP600 analysis codes with limited modifications.

Analysis Plan/Scaling Assessment Deliverable

- Deliverable similar to "AP600 Test and Analysis Plan for Design Certification", WCAP-14141.
- Table of Contents
  - AP1000 Design Description Section.
  - Phenomena Identification and Ranking Table (PIRT) Section.
  - Testing Section.
  - Scaling Section.
  - Code/Model Validation Plan Section.

AP1000 Design Description Section

- Brief description of AP1000 design.
- Summary of major differences in scale between AP600 and AP1000 (i.e. core power, containment height, active fuel length, pressurizer volume, etc.) .
- Component/layout drawings highlighting key physical dimensions to support PIRT and Scaling assessments.

Phenomena Identification and Ranking Table (PIRT) Section

- Brief summary of important (i.e. high ranked) AP600 phenomena by transient and phase of transient.
- Results of expert reviews of AP600 PIRTs for application to AP1000.
- SBLOCA, LBLOCA, Non-LOCA. Potential reviewers include – L. Hochreiter, S. Levy, T. Fernandez, S. Bajorek.
- Containment. Potential reviewers include P. Peterson, G. Bankoff, G. Yadigaroglou.
- Reconciliation of expert review comments for AP1000.
- PIRT tables for AP1000 and summary of high ranked phenomena.
- Discussion and assessment of differences (if any) between AP600 and AP1000 PIRTs.

Testing Section

- Brief summary of AP600 testing program.
- SBLOCA, LBLOCA, Non-LOCA Transients
  - OSU, SPES-2, CMT, ADS, and PRHR Tests
- Containment
  - LST, Air Flow/Water Distribution, Water Film, Wind Tunnel, Heated Flat Plate, and Univ. of Wisconsin Condensation Tests
- Discussion of sufficiency of existing data bases for code validation of high ranked phenomena for AP1000.
- Sources of data identified for important phenomena.
- Scaling Analysis will justify application of AP600 test data base to AP1000.

Scaling Section

- Approach to scaling effort based largely upon Hierarchical, Two-tiered Scaling Analysis methodology per NUREG/CR-5809. AP1000 scaling effort streamlined to apply AP600 lessons learned.
- SBLOCA scaling will focus on ADS and Transition to IRWST/Sump injection phases. These phases were found to be most important and unique to AP600.
- LBLOCA behaves as conventional plant for which code validation exists. Passive features do not play an important role (break provides the depressurization and the accumulators recover the plant). AP1000 expected to behave similarly therefore, as with AP600, testing and scaling not required.

Scaling Section

- Non-LOCA transient scaling will focus on CMT and PRHR components as they were important and unique to AP600. Therefore, they will be addressed for AP1000 as well.
- Containment scaling will focus on important processes for limiting large break LOCA (steam line or cold leg break).

Scaling Section

- Results in matrix or tabular format including high ranked phenomena, key scaling groups addressing this phenomena, and numerical scaling ratios of test facilities relative to AP600 and AP1000.
- Discussion of differences in scaling results relative to AP600 and AP1000.
- Identify where important phenomena adequately scaled so suitable for code validation.
- Identify where conservative approach needed to deal with scaling distortions.

Scaling Section

- Document scaling equations, derivation of scaling groups, and reference values used to numerically evaluate scaling groups for AP1000 in an Appendix.
- To improve scaling efficiency and usefulness in, scaling equations from AP600 may be recast or recombined to reduce number of scaling groups needed to be evaluated. Information is not lost, it is simply compacted or reformulated.

Code/Model Validation Plan Section

- Approach to code validation effort. Validate only new or re-ranked phenomena based upon AP1000 PIRT.
- Summary of models, correlations to address important phenomena.
- Analysis code plan
  - NOTRUMP
    - Address Momentum Flux in ADS-4 Flow Path
    - Update to latest version
  - WCOBRA/TRAC
    - Update to latest version
  - WGOTHIC
    - Use AP600 version
  - LOFTRAN
    - Update to latest version

Item 2 - Applicability of AP600 Test Program

- *The AP1000 Design Certification Application will not require additional tests to be performed by the applicant.*
- W Deliverable:
  - AP1000 Analysis Plan and Scaling Assessment of AP600 Test Program
- W Expectation:
  - NRC determination that the AP600 test program meets the requirements of Part 52 for the AP1000.

PXS Transition Margin Importance

- AP600 PXS Provides Performance Margin for Transition to IRWST Injection
  - Minimum RCS mass occurs in this phase
  - AP600 FSER (NUREG-1512)
    - Scaling distortions recognized
    - Code limitations identified
    - Acceptable based on large margins
- AP1000 Design Approach is Same
  - Provide similar transition performance margin
    - ADS stage 4 vent capacity
    - IRWST injection capacity
    - Containment recirculation capacity

PXS Transition Margin Assessment

- Determine Relative Performance AP600/AP1000
  - Calculate IRWST injection and ADS vent flow rates
    - For several different LOCAs size / location / times
      - Consider failures / line resistances
      - Fixed containment / RCS conditions
- Evaluate Results
  - Discuss relative margins
  - Objective is to support test / analysis approach
    - Large AP1000 margins similar to AP600

Item 3 - AP1000 Analysis Plan

- *The AP1000 Design Certification Application can utilize the AP600 analysis codes with limited modifications.*

- W Deliverable:
  - AP1000 Analysis Plan and Scaling Assessment of AP600 Test Program (See Item 2)
  - AP1000 Passive Core Cooling System Design Margins Assessment

- W Expectation:
  - NRC determination that the AP600 analysis codes including the proposed changes are adequate for analyzing the AP1000.

AP1000
Probabilistic Risk Assessment

Selim Sancaktar
Westinghouse Electric Company

Item 4 - AP1000 PRA

- *The AP1000 Design Certification Application can utilize the AP600 PRA supplemented with a sensitivity study to meet the requirements for a plant-specific PRA.*

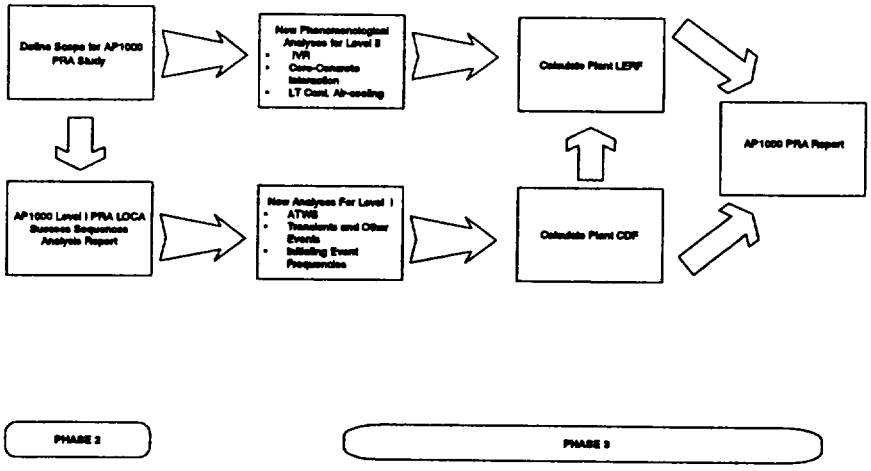
- W Deliverable:
  - Table of Contents for the AP1000 PRA Study
  - AP1000 Level 1 PRA LOCA Success Sequences Analysis Report

- W Expectations:
  - NRC determination that the AP600 PRA supplemented with a simple sensitivity study meets the requirements for the AP1000 plant-specific PRA
  - Agreement that the results of the AP1000 Level 1 PRA LOCA Success Sequences Analysis Report are sufficient to conclude that the AP1000 Level 1 success criteria for LOCA is the same as for the AP600

AP1000 Approach to PRA

- AP1000 design changes consider PRA
  - System design features sized to maintain PRA success criteria
  - System configurations maintained
- AP600 PRA quantification is maintained
  - Submit AP1000 PRA Study
    - Demonstrate AP600 PRA valid for AP1000
      - Address initiating event frequencies
      - Confirm success criteria
      - Core damage frequency and large release frequency
        - No appreciable change in CDF / LRF expected
        - Evaluations of severe accident phenomenon provided
    - Demonstrate AP600 insights valid for AP1000

AP1000 PRA Report



AP1000 PRA Level 1 Success Criteria

- Goal is to keep success criteria the same or better than AP600
- Demonstrate that goal is achieved
  - Cover phenomena that occur during LOCA sequences
    - Events analyzed in MAAP4 Benchmarking Report will be analyzed for AP1000
    - Compare AP1000 results with AP600 results to show success criteria maintained

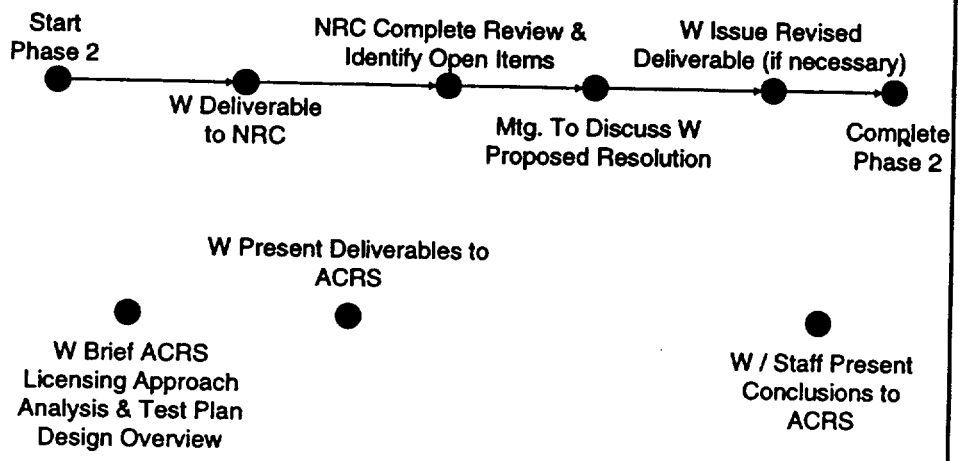
Item 4 - AP1000 PRA

- *The AP1000 Design Certification Application can utilize the AP600 PRA supplemented with a sensitivity study to meet the requirements for a plant-specific PRA.*

- W Deliverable:
  - Table of Contents for the AP1000 PRA Study
  - AP1000 Level 1 PRA LOCA Success Sequences Analysis Report

- W Expectations:
  - NRC determination that the AP600 PRA supplemented with a simple sensitivity study meets the requirements for the AP1000 plant-specific PRA
  - Agreement that the results of the AP1000 Level 1 PRA LOCA Success Sequences Analysis Report are sufficient to conclude that the AP1000 Level 1 success criteria for LOCA is the same as for the AP600

Proposed Review Process for Phase 2



Other Aspects of AP1000 Licensing Approach

- Same approach to passive plant issues
  - Safe shutdown requirements for passive plants
  - No safety-related AC power required
  - 7-day on-site coping capability provided
  - Nonsafety availability controls provided
- Same approach to ITAACS
  - Only changes to AP600 ITAAC will be:
    - Differences in acceptance criterion due to design changes
      - PCS water storage tank volume
      - Pump inertia
      - Safety valve capacity
    - Possible ITAAC changes due to reduced scope of Certified Design

Final Considerations for Phase 2

- NRC deliverables for phase 2
  - SECY letter?
- W seeking deliverable from ACRS on Approach and Conclusions of Phase 2
- W seeking NRC input on possible AP1000 Application
  - Cost / Schedule for Design Certification
- NRC Feedback