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Your ref: Project Number 740
Our ref: DCP/NRC2048

December 4, 2007

Subject: AP1000 COL Standard Technical Report Submittal of APP-GW-GLN-105, Revision 2 (TR 105)

In support of Combined License application pre-application activities, Westinghouse is submitting Revision 2 of AP1000 Standard Combined License Technical Report Number 105. This report identifies and justifies standard changes to the AP1000 Design Control Document (DCD). The changes to the DCD identified in Technical Report 105 are included in the proposed amendment to the AP1000 Design Certification Rule (DCD Revision 16). The purpose of this Revision to TR105 is solely to provide enlarged drawings with increased legibility as requested by the NRC. This report is submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in this report is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

The purpose for submittal of this report was explained in a March 8, 2006 letter from NuStart to the NRC.

Pursuant to 10 CFR 50.30(b), APP-GW-GLN-105, Revision 2, "Building and Structure Configuration, Layout, and General Arrangement Design Updates," (Technical Report Number 105), is submitted as Enclosure 1 under the attached Oath of Affirmation. Revision 1 of TR105 was submitted under Westinghouse letter DCP/NRC2013 on October 2, 2007. Revision 0 of TR105 was submitted under Westinghouse letter DCP/NRC1933 on June 12, 2007. A public (redacted) version of TR105 Revision 2 is provided as Enclosure 2.

Enclosure 1 contains sensitive unclassified non-safeguards information relative to the physical protection of an AP1000 Nuclear Power Plant that should be withheld from public disclosure pursuant to 10 CFR 2.390(d). Enclosure 2 is a redacted version of Enclosure 1.

It is expected that when the NRC review of Technical Report Number 105 is complete, the changes to the DCD identified in Technical Report 105 will be considered approved generically for COL applicants referencing the AP 1000 Design Certification.

Questions or requests for additional information related to content and preparation of this report should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

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D079

NRO

Westinghouse requests the NRC to provide a schedule for review of the technical report within two weeks of its submittal.

Very truly yours,

A. Sterdis, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Attachment

1. "Oath of Affirmation," dated December 4, 2007

/Enclosures

1. APP-GW-GLN-105, Revision 2, "Building and Structure Configuration, Layout, and General Arrangement Design Updates," Technical Report Number 105

2. APP-GW-GLN-105-NS, Revision 2, "Building and Structure Configuration, Layout, and General Arrangement Design Updates," Technical Report Number 105 (Redacted Version)

cc:	D. Jaffe	- U.S. NRC	1E	1A
	E. McKenna	- U.S. NRC	1E	1A
	G. Curtis	- TVA	1E	1A
	P. Hastings	- Duke Power	1E	1A
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	C. Pierce	- Southern Company	1E	1A
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	N. Costanzo	- Westinghouse	1E	1A

ATTACHMENT 1

"Oath of Affirmation"

ATTACHMENT 1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	)
NuStart Bellefonte COL Project	)
NRC Project Number 740	)

APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

W. E. Cummins, being duly sworn, states that he is Vice President, Regulatory Affairs and Standardization, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.

W. E. Cummins
Vice President
Regulatory Affairs and Standardization

Subscribed and sworn to
before me this 4th day
of December 2007.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Patricia S. Aston, Notary Public
Murrysville Boro, Westmoreland County
My Commission Expires July 11, 2011
Member, Pennsylvania Association of Notaries

Notary

ENCLOSURE 1

APP-GW-GLN-105, Revision 2

"Building and Structure Configuration, Layout, and General Arrangement Design Updates"

Technical Report Number 105

Enclosure 1 contains sensitive unclassified non-safeguards information relative to the physical protection of an AP1000 Nuclear Power Plant that should be withheld from public disclosure pursuant to 10 CFR 2.390(d).

ENCLOSURE 2

APP-GW-GLN-105-NS, Revision 2

"Building and Structure Configuration, Layout, and General Arrangement Design Updates"

Technical Report Number 105

Public Version

Redacted version of Enclosure 1 with sensitive unclassified non-safeguards information related to the physical protection of an AP1000Nuclear Plant withheld from public disclosure pursuant to 10 CFR 2.390(d).

AP1000 DOCUMENT COVER SHEET

TDC:_____ Permanent File:_____

AP1000 DOCUMENT NO.	REVISION	PAGE	ASSIGNED TO	OPEN ITEMS (Y/N)
APP-GW-GLN-105	2	1 of 259	W-Lee	N

ALTERNATE DOCUMENT NUMBER: 105 WORK BREAKDOWN #:

ORIGINATING ORGANIZATION: Westinghouse

TITLE: **Building and Structure Configuration, Layout, and General Arrangement Design Updates**

ATTACHMENTS:	DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION:
N/A	APP-GW-GEE-: 40/3, 69/1, 103/0, 112/0, 121/1, 130/0, 158/0, 159/0, 160/0, 162/0, 167/0, 168/0, 170/0, 174/0, 175/0, 190/0, 201/0, 207/0, 216/0, 228/0, 232/0, 233/0, 238/0, 244/1, 246/1, 248/1, 269/0
CALCULATION/ANALYSIS REFERENCE:	

ELECTRONIC FILENAME	ELECTRONIC FILE FORMAT	ELECTRONIC FILE DESCRIPTION

☐ WESTINGHOUSE NON PROPRIETARY CLASS 3

Class 3 Documents being transmitted to the NRC require the following two review signatures in lieu of a Form 36.

LEGAL REVIEW T. J. White	SIGNATURE / DATE
PATENT REVIEW D. E. Ekeroth	SIGNATURE / DATE

☐ WESTINGHOUSE PROPRIETARY CLASS 2

ORIGINATOR(S) N. Costanzo	SIGNATURE / DATE	
REVIEWER(S)	SIGNATURE / DATE	
	SIGNATURE / DATE	
	SIGNATURE / DATE	
VERIFIER(S) J. Willis	SIGNATURE / DATE	Verification Method Independent Review Comparison to DCD Figures

**Plant Applicability: ☐ All AP1000 plants except:
☐ Only the following plants:

APPLICABILITY REVIEWER** J. A. Speer	SIGNATURE / DATE
RESPONSIBLE MANAGER* L. Tunon-Sanjur	SIGNATURE / DATE

* Approval of the responsible manager signifies that the document and all required reviews are complete, the appropriate proprietary class has been assigned, electronic file has been provided to the EDMS, and the document is released for use.

APP-GW-GLN-105
Revision 2

October 2007

AP1000 Standard Combined License Technical Report

Building and Structure Configuration, Layout, and General Arrangement Design Updates

Westinghouse Electric Company LLC
P.O. Box 355
Pittsburgh, PA 15230-0355

Document Number: APP-GW-GLN-105 **Revision Number:** 2

Title: Building and Structure Configuration, Layout, and General Arrangement Design Updates

Security Related Information Withhold under 10 CFR 2.390

Table of Contents

Document Number: APP-GW-GLN-105 **Revision Number:** 2

Title: Building and Structure Configuration, Layout, and General Arrangement Design Updates

Security Related Information Withhold under 10 CFR 2.390

Record of Revisions

Rev	Date	Revision Description[1]
0	5/23/07	Original Issue
1	9/10/07	In II. Technical Description and Justification, additional TR references, added Section 32.0. In IV. Regulatory Impact, additional licensing information added to the beginning of the section.
2	10/30/07	Increased size of drawings to improve legibility.

Note (1) Significant changes are briefly described in this table. In the rest of the technical report, each row that has been changed is marked using a revision bar in the margin of the page. This approach satisfies the change identification requirements in WP 4.5 Section 7.4.

Document Number: APP-GW-GLN-105 **Revision Number:** 2

Title: Building and Structure Configuration, Layout, and General Arrangement Design Updates

Security Related Information Withhold under 10 CFR 2.390

Brief Description of the change (what is being changed and why):
The purpose of this document is to identify the location and description of the changes to the general arrangement and related drawings made in Revision 16 of the AP1000 Design Control Document (DCD). Building configuration, layout, and general arrangement drawings have been updated for the AP1000 Nuclear Island and adjacent buildings. These changes are outlined below.

I. APPLICABILITY DETERMINATION

This evaluation is prepared to document that the changes described in Section II above is a departure from Tier 2 information of the AP1000 Design Control Document (DCD) that may be included in plant specific FSARs without prior NRC approval.

A.	Does the proposed change include a change to:		
	1. Tier 1 of the AP1000 Design Control Document APP-GW-GL-700	☐ NO ☒ YES	(If YES prepare a report for NRC review of the changes)
	2. Tier 2 of the AP1000 Design Control Document, APP-GW-GL-700	☐ NO ☒ YES	(If YES prepare a report for NRC review of the changes)
	3. Technical Specification in Chapter 16 of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a report for NRC review of the changes)
B.	Does the proposed change involve:		
	1. Closure of a Combined License Information Item identified in the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a COL item closure report for NRC review.)
	2. Completion of an ITAAC item identified in Tier 1 of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare an ITAAC completion report for NRC review.)

☐ The questions above are answered no, therefore the departure from the DCD in a COL application does not require prior NRC review unless review is required by the criteria of 10 CFR Part 52 Appendix D Section VIII B.5.b. or B.5c

II. TECHNICAL DESCRIPTION AND JUSTIFICATION

1.0 Introduction

A number of structural changes have resulted in revisions to the general arrangement, fire area, radiation area, and room numbering figures. Each of these structural changes is outlined below, to provide a description of the changes made to the figures in Revision 16 of the DCD. Applicable Tier 1 figure changes are located in section 3.3. Tier 2 figure changes are located in sections 1.2, 3.7, 3.8, 6.2, 9A, and 12.3.

2.0 DCP 040: AP1000 Pressurizer Changes

This DCP describes a new pressurizer drawing and changes to the height of the pressurizer within the shield building. The changes made to the pressurizer, along with any relating structural changes to the AP1000, are detailed in TR 36 and TR 37.

These changes are seen in Figures III-1, III-2, III-3, III-4, III-29, III-30, III-37, III-38, III-39, III-40, III-41, III-42, III-43, III-44, III-77, III-78, III-81, III-82, III-83, III-84, III-109, III-110, III-111, III-112, III-113, III-114, III-115, III-116, III-117, III-118, III-131, III-132, III-133, and III-134.

3.0 DCP 069: IHP Dose Reduction-Change in Material of ICI Sheath

This DCP describes a change to the radiation level in the indicated room and adds a note to the drawing. The radiation zone label is changed to Designation V and note #2 is changed to explain why the radiation level could be greater than 100mrem/hr.

These changes are seen in Figures III-165 and III-166.

4.0 DCP 103: Access Control Modifications to the Auxiliary and Annex Buildings

The following subsections detail structural changes made relating to the access control of the AP1000 auxiliary and annex buildings.

These changes are seen in Figures III-7, III-8, III-9, III-10, III-17, III-18, III-19, III-20, III-25, III-26, III-27, III-28, III-29, III-30, III-31, III-32, III-45, III-46, III-47, III-48, III-49, III-50, III-71, III-72, III-73, III-74, III-75, III-76, III-85, III-86, III-89, III-90, III-91, III-92, III-93, III-94, III-99, III-100, III-101, III-102, III-103, III-104, III-105, III-106, III-121, III-122, III-123, III-124, III-125, III-126, III-135, III-136, III-149, III-150, III-151, III-152, III-153, III-154, III-161, III-162, III-163, III-164, III-165, III-166, III-171, III-172, III-173, III-174, III-175, III-176, III-185, III-186, III-187, III-188, III-189, III-190, III-195, III-196, III-197, III-198, III-199, III-200, III-207, III-208, III-209, III-210, III-211, III-212, III-217, III-218, III-219, III-220, III-221, and III-222.

4.1 Annex Building Area 1

The following structural changes are applied:

- The entry point into the access area of the annex building is relocated.
- A cart pass-thru corridor is added.
- The three security rooms are rearranged.
- The turbine building access door at elevation 100'-0" is deleted.
- The rest room is reduced in size.
- The walls around the individual turnstiles are deleted, and the turnstiles are repositioned.

- The south wall of Room 40306 is changed to a reinforced concrete wall.

4.2 Annex Building Area 2

The following structural changes are applied:

SRI

4.3 Annex Building Area 3

The following structural changes are applied:

- A new corridor is added along the west end of the hot machine shop (room number 40358) at elevation 100'-0". This corridor is formed through the addition of a reinforced concrete wall. This corridor is designated room number 40362. An open stair run allows for access between the 100'-0" and 107'-2" elevations. A lift platform runs adjacent to this stair run.
- A floor slab is added at elevation 121'-0" directly above the corridor room 40362. This creates a second level corridor designated room number 40415. A concrete enclosure is added on the north side of room 40415 which extends into area 2 of the annex building. Existing walls within the annex and auxiliary building provide the south and west walls for this enclosure.
- The floor area of the hot machine shop (room number 40358) is reduced by the inclusion of the corridor (room number 40362).

4.4 Auxiliary Building Area 4

The following structural changes are applied:

- A new door is added in the northeast corner of room number 12351 to allow for access between the auxiliary building and the annex building room number 40326. The existing door in the south corner of room number 12351 is removed. The direction of the door to the personnel hatch is changed.

- Room 12451 is extended southward, now bound by the existing reinforced concrete wall to the south of the room. A new door is added to the southwest corner of room 12451, connecting to room 40415 of the annex building. A platform is added at elevation 121'-0" to access room 40415.
- Rooms 12551 and 12552 are deleted.

SRI

5.0 DCP 112: Spent Fuel Pool Layout Capacity

The capacities of the spent fuel storage racks and new fuel storage racks located at elevation 117'-6" are increased. The spent fuel storage rack capacity increases from 616 to 889. The new fuel storage rack capacity increases from 64 to 72.

These changes are described in TR 54, TR 65, and TR 74C. The changes are shown in Figures III-29 and III-30.

6.0 DCP 121: DAS Platform Technology, Remote Indication, Alternate Squib Valve Capability

Two cabinets are added to Room 12451. This change provides plant parameters indication and actuation capability for squib valves during situations in which the clean portion of the auxiliary building is not available. This change is described in TR 39 and TR 97, and is seen in Figures III-29 and III-30.

7.0 DCP 130: AP1000 Integrated Head Package Configuration

The Integrated Head Package Configuration is changed from the AP600 design to the AP1000 design. These changes are detailed in TR 61.

These changes are seen in Figures III-29, III-30, III-43, and III-44.

8.0 DCP 158: Expanded Office Area in AP1000 Annex Building

The following subsections detail structural changes made relating to the expanded office area of the AP1000 annex building.

These changes are seen in Figures III-17,III-18, III-19,III-20, III-21,III-22,III-45,III-46, III-47, III-48,III-49, III-50, III-55, III-56, III-139, III-140, III-149, III-150, III-151, III-152, III-153, III-154, III-171, III-172, III-173,III-174,III-175,III-176, III-179, III-180,III-195,III-196,III-197, III-198, III-199, III-200, III-203, III-204, III-217, III-218, III-219, III-220, III-221, III-222, III-225, III-226, III-232, and III-233.

8.1 Annex Building Area 4

The following structural changes are applied:

- An expanded office area is added to area 4 of the annex building. The new area expands northward from the original northern wall of the structure, and is bound by the north wall of area 1 of the annex building and the east wall of the turbine building. Rooms 40371, 40372, 40375, 40377, 40370, and 40376 are added as a result of this expansion. A two-hour fire barrier wall is added along the west wall of the expanded area.
- A new wall running along the north/south axis is used to divide the existing room 40313 evenly, forming room 40314.
- The separation between corridors 40311 and 40319 is deleted, and the entire resulting corridor is designated as 40311. The wall and opening located along the pre-existing north wall of corridor 40311 is deleted.

8.2 Turbine Building

The following changes are made to the turbine building as a result of the annex building expansion:

- At elevation 100'-0", the opening located at the south corner of the east wall of the turbine building heater bay is deleted.
- The panels for heater removal located along the east wall of the turbine building heater bay at elevation 135'-3" is moved north to accommodate the location of the expanded office area of the annex building.

9.0 DCP 159: AP1000 Turbine Building Variable Frequency Drive Relocation and Related Changes

The following structural changes are applied relating to the turbine building:

[ ] SRI

- The south bay is increased in width along the north-south dimension.
- Support columns are added along the southern wall of the turbine building.
- The south wall of the east bay of the turbine building is moved south to increase the width of the bay. A support column is moved south as well.

- A new floor level is added to the south bay at elevation 147'-6".
- A stair is added to the east side of the south bay between elevations 100'-0" and 117'-6"
- An access door is added to the northeast corner of the south bay at elevation 100'-0".
- A stair is added to the west side of the south bay between elevations 135'-3" and 147'6".
- New rooms are added to the northeast corner of the turbine building at elevation 149'-0", including rooms 20505, 20507, and 20508.
- The floor at elevation 187'-0" is raised to 187'-3".

These changes are described in TR 111, and seen in Figures III-55,III-56,III-57,III-58,III-59,III-60,III-61,III-62, III-63, III-64, III-65, III-66,III-69,III-70,III-139,III-140, III-141, III-142, III-143, III-144, III-145, III-146, III-147, III-148, III-179, III-180, III-181, III-182, III-203, III-204, III-225, III-226, III-227, and III-228.

10.0 DCP 160: Specialty & Water Tight Doors (Auxiliary, Annex and Turbine Buildings)

A number of doors are added to the auxiliary, annex and turbine buildings. The locations of these doors can be seen in the figures in section III.

These changes are seen in Figures III-7, III-8, III-9, III-10, III-11, III-12, III-25, III-26, III-27, III-28, III-29, III-30, III-31, III-32, III-45, III-46, III-47, III-48, III-49, III-50, III-55, III-56, III-57, III-58, III-59, III-60, III-71, III-72, III-91, III-92, III-121, III-122, III-123, III-124, III-125, III-126, III-139, III-140, III-141, III-142,III-143,III-144, III-149, III-150, III-151, III-152, III-153, III-154, III-161, III-162, III-163, III-164, III-165,III-166,III-171,III-172, III-173, III-174, III-175, III-176, III-179, III-180, III-181, III-182, III-185, III-186,III-187,III-188, III-189,III-190,III-195,III-196,III-197, III-198, III-199, III-200, III-203, III-204, III-207, III-208, III-209, III-210,III-211, III-212, III-217, III-218, III-219, III-220, III-221, III-222, III-225, III-226, III-227, and III-228.

11.0 DCP 162: Turbine Building Observation Posts and Personnel Enclosures

- A thicker wall is erected about the southwest outer stairwell enclosure. The door now swings in the opposite direction.
- An enclosure is built surrounding the northwest interior stairwell at elevation 161'-0". A door is placed upon the eastern wall of this enclosure. Room 20601's western wall is moved east to form a separate room.
- An opening is made in the elevator shaft located at elevations 161'-0" and 187'-3".
- Room 20601 is increased in height to 196'-0". SRI

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These changes are seen in Figures III-55,III-56,III-57,III-58,III-59,III-60,III-61,III-62, III-63, III-64, III-65, III-66, III-67, III-68, III-69,III-70, III-139, III-140, III-141, III-142,III-45, III-146, III-147, III-148, III-179, III-180, III-181, III-182, III-203, III-204, III-225, III-226, III-227, and III-228.

12.0 DCP 167: Radwaste Building Extension

The following structural changes are applied relating to the radwaste building expansion:

- A truck bay extension is added between the current radwaste building and annex building. The extension room number is 50354 and the room name is Truck Staging Area. It is adjacent to and in series with the truck bay in the auxiliary building. A door opening is placed within the east wall of the truck bay extension.
- The roof of the truck bay extension is a continuation of the current radwaste building roof and interfaces with the east wall of the auxiliary building and with the south wall of the annex building.
- The controlled access door in room 12371 of the auxiliary building is removed.
- A new door opening is added to the pre-existing northeast corner of the radwaste building to allow for access to the truck bay extension.
- A parapet wall is added to the perimeter of the radwaste building roof. Three observation positions are added, located on the southeast, southwest, and northwest corners of the radwaste building.

These changes are seen in Figure III-7,III-8,III-25,III-26,III-53,III-54,III-71,III-72, III-121, III-122, III-155, III-156, III-161, III-162, III-177, III-178, III-185, III-186, III-201, III-202, III-207, III-208, III-223, III-224, III-232, and III-233.

13.0 DCP 168: AP1000 Annex Building Area 2 East Stairwell/Elevator Enclosure Observations Positions and Roof Parapet

The following structural changes are applied relating to area 2 of the AP1000 annex building:

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These changes are seen in Figure III-17,III-18,III-19,III-20,III-21, III-22, III-45, III-46, III-47, III-48, III-49, III-50, III-97, III-98, III-149, III-150, III-151, III-152, III-153, III-154, III-171, III-172, III-173, III-174, III-175, III-176, III-195, III-196, III-197, III-198, III-199, III-200, III-217, III-218, III-219, III-220, III-221, and III-222.

14.0 DCP 170: Polar Crane Design

This DCP describes changes made to the nuclear island polar crane. The new crane is seen in the Nuclear Island General Arrangement Section B-B figure with equipment shown. These changes are described in TR 106.

This change corresponds to Figures III-39, III-40, III-43, III-44, III-117, and III-118.

15.0 DCP 174: AP1000 Diesel Generator Building

The following structural changes are applied relating to the diesel generator building:

- An external stairwell enclosure is proposed, providing roof access. The stairwell is located to the east side of the diesel generator building with the entrance to the stairwell facing to the east.

SRI

[ ]

These changes are seen in Figures III-51, III-52, III-157, III-158, III-232, and III-233.

16.0 DCP 175: Dry Storage Cask Transportation Related Modifications (Auxiliary Building)

The current door located at the southeast corner of the auxiliary building, along the east wall, is replaced by two doors, an outer hinged swinging door and an inner roll up door. The overall doorway area is increased in size.

This change is seen in Figures III-7, III-8, III-25, III-26, III-121, III-122, III-161, III-162, III-185, III-186, III-207, and III-208.

17.0 DCP 190: Main Control Room Layout

The Main Control Room layout detail has been removed from the appropriate figures. TR-82 contains further information regarding MCR design. This change is seen in Figures III-29 and III-30.

18.0 DCP 201: Fast Bus Transfer

The transformer area is modified in this DCP, resulting in a change to the site plan drawing and the arrangement of surrounding structures. This change is described in TR 79, and is seen in Figures III-232 and III-233.

19.0 DCP 207: AP1000 PXS Containment Recirculation and IRWST Screen Configurations

This DCP describes changes made to the configuration of the IRWST screens. These changes, along with any relating structural changes inside of containment, are detailed in TR 26.

These changes are seen in Figures III-5,III-6,III-23,III-24,III-27,III-28,III-29,III-30,III-119,III-120, III-123, III-124, III-159, III-160, III-163, III-164, III-183, III-184, III-187, III-188, III-205, III-206, III-209, and III-210.

20.0 DCP 216: Toshiba Turbine-Generator and Steam Cycle Design

The previous turbine arrangement has been changed to reflect the use of Toshiba technology in the AP1000 plant. These changes are described in TR 86, and seen in Figures III-63, and III-64.

21.0 DCP 228: Outside Air Inlet Structure

A small room is added to the north end of room 12601. The nearby air intake structure is relocated to this room. These changes are mentioned in TR 122 and seen in Figures III-13,III-14,III-15,III-16,III-33,III-34, III-35,III-36, III-77, III-78, III-79, III-80,III-85,III-86,III-87,III-88,III-111,III-112,III-127,III-128,III-129, III-130,III-135, III-136, III-167, III-168, III-169, III-170, III-191, III-192, III-193, III-194, III-213, III-214, III-215, and III-216.

22.0 DCP 232: Radwaste Building Extension/WLS Monitor Tank Addition

The following structural changes are applied relating to the addition of WLS monitor tanks to the radwaste building:

- A new room is added to the west of rooms 50352, the packaged waste storage room, and 50351, the waste accumulation room. This room is designated 50355, the monitor tanks room. The addition of this room increases the size of the radwaste building. Rooms 50300, the electrical/mechanical equipment room, and

50353, the HVAC equipment room, are moved westward to accommodate the addition of room 50355. A new concrete wall separates rooms 50300 and 50353 from room 50355/

- The southeast door of room 50351 is changed from its current configuration into a sliding shield door.

These changes are described in TR 116, and seen in Figures III-53, III-54, III-155, III-156, III-177, III-178, III-201, III-202, III-223, III-224, III-232, and III-233.

23.0 DCP 233: MCR Layout – Rooms Outside of Main Control Room

This DCP describes changes made to the arrangement and designation of several rooms surrounding the main control room. These changes are detailed in TR 82.

These changes are seen in Figures III-9, III-10, III-27, III-28, III-29, III-30, III-117, III-118, III-137, III-138, III-163, III-164, III-209, III-210, III-187, and III-188.

24.0 DCP 238: Control Support Area in Annex Building

Room 40403 of the annex building has been renamed from the Technical Support Center (TSC) to the Control Support Area (CSA). Pre-existing references to the TSC are replaced with the CSA in all applicable drawings.

These changes are described in TR 107, and are seen in Figures III-19, III-20, III-47, III-48, III-151, III-152, III-173, III-174, III-197, III-198, III-219, and III-220.

25.0 DCP 244: Addition of Cyber Security Level 3 Computer Room

This DCP builds upon changes previously described in Section 6.0.

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These changes are described in TR 104, and are seen in Figures III-45, III-46, III-149, III-150, III-171, III-172, III-195, III-196, III-217, and III-218.

26.0 DCP 246: Containment Air Cooling Diffuser Grating Platforms

Two steel grating platforms are installed within the Shield Building roof opening. This change is seen in Figures III-1, III-2, III-3, III-4, III-15, III-16, III-35, III-36, III-37, III-38, III-39, III-40, III-41, III-42, III-43,

III-44, III-81, III-82, III-83, III-84, III-117, III-118, III-129, III-130, III-131, III-132, III-133, III-134, III-169, III-170, III-193, III-194, III-215, and III-216.

27.0 DCP 248: AP1000 Shield Building Structure Design Enhancement

This DCP describes the lowering of the overall height of the AP1000 Shield building. In addition, the thickness of the walls along the conical roof of the shield building is increased. New steel beam detail is added to the revised figure 3.8.4-2 in Tier 2 of the DCD.

These changes are described in TR 57, and are seen in Figures III-1, III-2, III-3, III-4, III-15, III-16, III-35, III-36, III-37, III-38, III-39, III-40, III-41, III-42, III-43, III-44, III-79, III-80, III-81, III-82, III-83, III-84, III-107, III-108, III-117, III-118, III-129, III-130, III-131, III-132, III-133, III-134, III-169, III-170, III-193, III-194, III-215, and III-216. The changes are also discussed in Section 32.0 of this document.

28.0 DCP 269: Shield Building Roof Air Inlet Openings and Associated Platforms

Detail of area between beams is added to Shield Building section drawings. These changes have not been shown to cause a significant negative safety impact upon the passive containment cooling system.

These changes are seen in Figures III-1, III-2, III-3, III-4, III, 15, III-16, III-35, III-36, III-37, III-38, III-39, III-40, III-41, III-42, III-43, III-44, III-81, III-82, III-83, III-84, III-117, III-118, III-129, III-130, III-131, III-132, III-133, III-134, III-169, III-170, III-193, III-194, III-215, and III-216. The changes are also discussed in Section 32.0 of this document.

29.0 TR 49: AP1000 Enhancement Report

This technical report modifies the site plan of the AP1000 and adds information to the "Notes" section. These changes are seen in Figures III-232 and III-233

30.0 General Turbine Building Layout

The turbine building drawings reflect the initial configuration of the AP1000 Turbine Building. Any differences between Revision 15 and Revision 16 Turbine Building figures, with the exception of the changes detailed in previous sections, reflect differences between AP600 and AP1000. These are not considered to be revisions to a pre-existing AP1000 Turbine Building.

31.0 Additional Site Plan Information

Item #23 and #25 have been added or modified in the AP1000 site plan. The layout in the current figure reflects the initial layout for the AP1000 site plan. These items are not considered to be revisions to a pre-existing AP1000 site plan.

32.0 Shield Building Design Changes and the Implication for Safety Analysis

DCPs 248 and 269 describe changes to the AP1000 containment shield building. These changes were made primarily to strengthen the shield building against additional external hazards. The changes consist of modifying the air flow inlets through the addition of 384 inlet ducts to take the place of 15 large discrete openings in the original design. In addition, two heavy barrier grates were installed in the chimney to protect the containment from objects from directly above, and the overall length of the heated flow path (bottom of the annulus to the top of the chimney) was reduced by 5 ft. The result of these changes is a more robust shield building that is capable of withstanding additional external hazards.

The shield building serves two other functions; biological shielding and support for passive containment cooling. The design changes are advantageous for biological shielding since they eliminate large openings in the thick concrete building. For passive containment cooling, the shield building supports the passive containment cooling water storage tank (PCCWST) that is located at the top, and provides water for removing decay heat in the event of an accident.

For design basis accidents, the peak containment pressure must be less than the design pressure of the containment (74 psia). In addition, the pressure after 24 hours must be less than one-half the design pressure (37 psia). To achieve this, the passive containment cooling system (PCS) is designed with redundant and diverse valves to provide cooling water. Three separate paths are provided; two isolated with air operated valves, and one isolated with a motor operated valve. Any one path is sufficient to provide adequate containment cooling. Water flows downward in a thin film along the outside of the containment shell and is evaporated by the heated shell. Air enters into the openings near the top of the shield building, flows downward through an 3-ft. wide annulus between the shield building and air baffle, turns at the bottom of the baffle, and enters a narrow, 12-inch annulus between the baffle and the containment shell where it is heated and mixes with water vapor from the evaporating film. The air-vapor mixture exits the heated annulus and is exhausted through a circular chimney at the top of the shield building. The heated air and water vapor is more buoyant than the cooler air outside the shield building and a natural circulation air flow is established. Thus, heat removal on the outside of the containment shell is accomplished by a combination of evaporation of the water film and convection to the air flowing past the containment shell. The heat removal due to evaporation can be up to 50 times more effective than convection to the air.

Sensitivity studies were performed with the WGOTHIC containment analysis computer code to determine the effect of increasing the flow resistance along the air flow path. Conservative estimates of the resistances of the new inlet design and outlet gratings were incorporated into the WGOTHIC evaluation model that was used to determine the response to several design basis events including the double-ended rupture of a main steam line (MSLB), a double-ended cold leg LOCA (DECL), and a double-ended hot leg LOCA (DEHL). The air flow resistance for the new design was conservatively increased approximately 30%. As the DECL relies most heavily on the PCS, this case was chosen for the design basis sensitivity study. Two computer simulations were performed; one with the previous design, and one with the new design. The new design showed a reduction in the air flow rate due to the air flow resistance (inlet through exhaust) increase. However, since the evaporative

heat transfer dominates heat removal from the shell, the increase in the containment pressure for the new design is small (~0.2 psi), and results in acceptable margins to the design pressure limit. Previous analyses were performed to show that blockage of a significant fraction of the air inlets (in the old design) could occur without significantly affecting the PCS performance provided water application is assured. Thus, no significant change to the design basis pressure response is expected for cases where the PCS operates as expected.

The PRA considers beyond design basis events where water is not available. For this case, air-only cooling is assumed, and the limiting pressure is failure limit for the containment which is assumed to be Service Level "C". Unlike the design basis case, increased resistance and/or decrease in the heated length of the air flow path which results in lower air flow will impact the heat removal capability. To compensate, the containment shell temperature will increase until sufficient buoyancy head is provided to remove the decay heat. Thus, the containment inside pressure and temperature will be higher for the new design relative to the old design for air-only cooling due to the more restrictive inlets, outlets, and the lower heated length of the flow path.

For the beyond design basis, air-only cooling case used for the sensitivity study, the initiating event is assumed to be a loss of offsite power. This results in decay heat being removed from the reactor coolant system to the IRWST via the PRHR heat exchanger. After the IRWST reaches the saturation temperature, steam is generated and released to the containment atmosphere. The pressure and temperature continue to increase until the heat removed from the outside of the containment shell equals the decay heat level. The limit for containment failure is assumed to be the Service Level "C" pressure limit of 129 psig. For the old design, the time to reach the Service Level "C" limit is 37 hours. For the new design, the time is 33 hours. In each case, the probability of containment failure is sufficiently delayed to allow the operators to take actions to either establish water cooling from a variety of water sources or to vent the containment. The combination of the high reliability of the PCS water supply and the long time provided by air cooling to secure alternate water supplies if needed result in the failure of PCS being so unlikely that it is not modeled in the PRA. Based on these calculations, there is no change to the PRA results resulting from the shield building design change for the same reasons.