

NuStart Energysm

January 04, 2008

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

52-14
52-15

ATTN: Stephanie Coffin

SUBJECT: NuStart Bellefonte COL Project - NRC Project No. 740
Transmittal of NRC-Accepted Technical Report AP-TR-NS01-A,
Revision 2, *Containment Leak Rate Test Program Description*

REFERENCE: Letter from Stephanie Coffin, NRC, to Marilyn Kray, NuStart, *Final Safety Evaluation for AP1000 Technical Report No. AP-TR-NS01, Containment Leak Rate Test Program (TAC No. MD5136)*, dated October 25, 2007

The purpose of this letter is to transmit Revision 2 of AP-TR-NS01-A, *Containment Leak Rate Test Program Description*. This revision acknowledges and includes the Staff's Safety Evaluation (SE) provided via the referenced letter [ADAMS Accession Number ML072620552] and provides the historical review information for this technical report. Additionally, Revision 2 is designated as approved via the addition of "-A" in the document number, and also is repaginated to accommodate insertion of the SE. This transmittal completes action on this technical report.

If you have questions, please contact me at (980) 373-7820.

Sincerely,

Peter S. Hastings, PE
AP1000 DCWG Lead

Designated
ORIGINAL per PM

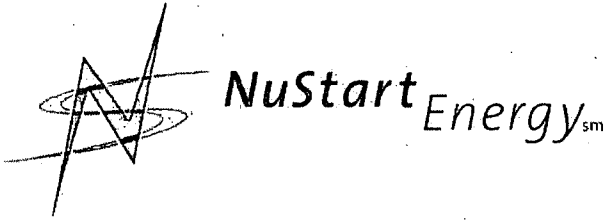
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January 04, 2008
Page 2 of 2

Enclosure: AP-TR-NS01-A, Revision 2, *Containment Leak Rate Test Program Description*

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Report: AP-TR-NS01-A
Revision 2

Date: December 2007

NuStart
AP1000 Standard Combined License
Technical Report

CONTAINMENT LEAK RATE TEST
PROGRAM DESCRIPTION

AP-TR-NS01-A
Revision 2

NuStart
AP1000 Standard Combined License
Technical Report

**CONTAINMENT LEAK RATE TEST
PROGRAM DESCRIPTION**

Revision Page

| Revision | Date | Description |
|-----------------|---------------|--|
| 0 | February 2007 | Initial issue |
| 1 | April 2007 | Revise format |
| 2 | December 2007 | Initial issue of NRC-accepted AP-TR-NS01-A, with NRC Safety Evaluation (SE) attached. Pages renumbered to accommodate insertion of NRC SE. |
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NRC Safety Evaluation

Table of Content

- A. Letter from Stephanie Coffin, NRC, to Marilyn Kray, NuStart, "Final Safety Evaluation for AP1000 Technical Report No. AP-TR-NS01, Containment Leak Rate Test Program (TAC No. MD5136)," dated October 25, 2007 [ML072620552].

October 25, 2007

Ms. Marilyn Kray
Vice President, Special Projects
Exelon Generation
200 Exelon Way, KSA3-E
Kennett Square, PA 19348

SUBJECT: FINAL SAFETY EVALUATION FOR AP1000 TECHNICAL REPORT NUMBER
AP-TR-NS01, CONTAINMENT LEAK RATE TEST PROGRAM
(TAC NO. MD5136)

Dear Ms. Kray:

On April 4, 2007, NuStart Energy, LLC (NuStart) submitted Rev. 1 of AP1000 Standard Combined License Technical Report (TR) Number AP-TR-NS01, Containment Leak Rate Test Program. The purpose of this TR is to complete the description of the Containment Leak Rate Test (CLRT) Program for those AP1000 Combined Construction and Operating License (COL) applicants who choose to implement the methodology described in this report and close COL Information Item 6.2-1. Appendix A to this TR describes a CLRT Program that implements Option B (for performance-based requirements) of 10 CFR Part 50, Appendix J.

The staff has found that AP-TR-NS01, Revision 1 is acceptable for referencing in licensing applications for AP1000 to the extent specified and under the limitations delineated in the TR and in the enclosed Safety Evaluation (SE). The SE defines the basis for acceptance of the TR.

Our acceptance applies only to material provided in the subject TR. We do not intend to repeat our review of the acceptable material described in the TR. When the TR appears as a reference in regulatory applications, our review will ensure that the material presented applies to the specific application involved. Regulatory applications that deviate from this TR will be subject to further review in accordance with applicable review standards.

In accordance with the guidance provided on the Nuclear Regulatory Commission (NRC) website, we request that NuStart publish the accepted version of this TR within three months of receipt of this letter. The accepted version shall incorporate this letter and the enclosed SE after the title page. Also, the accepted version must contain historical review information. The accepted version shall include a "-A" (designating accepted) following the TR identification symbol.

If future changes to the NRC's regulatory requirements affect the acceptability of this TR, NuStart will be expected to revise the TR appropriately, or justify its continued applicability for subsequent referencing.

M. Kray

- 2 -

If you have any questions, please contact me at smc1@nrc.gov or (301) 415-2757.

Sincerely,

/RA/

Stephanie Coffin, Branch Chief
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Project No.: 740

Enclosure:
Final Safety Evaluation

M. Kray

- 2 -

If you have any questions, please contact me at smc1@nrc.gov or (301) 415-2757.

Sincerely,

/RA/

Stephanie Coffin, Branch Chief
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Project No.: 740

Enclosure:
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FINAL SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

TOPICAL REPORT NUMBER AP-TR-NS01, REVISION 1

CONTAINMENT LEAK RATE TEST PROGRAM (TAC NO. MD5136)

PROJECT NO. 740

1.0 Introduction

In a letter dated April 4, 2007, NuStart Energy, LLC (NuStart) submitted Rev. 1 of AP1000 Standard Combined License Technical Report (TR) Number AP-TR-NS01, Containment Leak Rate Test (CLRT) Program. The purpose of this TR is to complete the description of the CLRT Program for those AP1000 Combined Construction and Operating License (COL) applicants who choose to implement the methodology described in this report and close COL Information Item 6.2-1. Appendix A to this TR describes a CLRT Program that implements Option B (for performance-based requirements) of 10 CFR Part 50, Appendix J. COL Information Item 6.2-1 in Revision 15 of the AP1000 Design Control Document is found in Section 6.2.6, as follows:

"6.2.6 Combined License Information for Containment Leak Rate Testing

The Combined License applicant is responsible for developing a 'Containment Leakage Rate Testing Program' which will identify which Option is to be implemented under 10 CFR 50, Appendix J. Option A defines a prescriptive-based testing approach whereas option B defines a performance-based testing program."

2.0 Regulatory Criteria

Conformance with the requirements of Option A of Appendix J, or the requirements of Option B of Appendix J and the provisions of RG 1.163, Performance-Based Containment Leak-Test Program, constitutes an acceptable basis for satisfying the requirements of the following General Design Criteria applicable to containment leakage rate testing:

1. General Design Criterion 52 (GDC 52), "Capability for Containment Leakage Rate Testing," as it relates to the reactor containment and exposed equipment being designed to accommodate the test conditions for the Containment Integrated Leakage Test (up to the containment design pressure).
2. General Design Criterion 53 (GDC 53), "Provisions for Containment Testing and Inspection," as it relates to the reactor containment being designed to permit appropriate inspection of important areas (such as penetrations), an appropriate surveillance program, and leakage rate testing at the containment design pressure of penetrations having resilient seals and expansion bellows.
3. General Design Criterion 54 (GDC 54), "Piping Systems Penetrating Containment," as it relates to piping systems penetrating primary reactor containment being designed with a capability to determine if valve leakage rate is within acceptable limits.

3.0 Technical Background and Evaluation

Pursuant to the DCD, the AP1000 reactor containment, containment penetrations, and isolation barriers are designed to permit periodic leak rate testing in accordance with GDC 52, 53 and 54. The CLRT system is designed to verify that leakage from the containment remains within limits established in the AP1000 Technical Specifications, DCD Chapter 16. Leak rate testing requirements are defined by 10 CFR Part 50, Appendix J, which classifies leak tests as Types A, B and C. The system design accommodates the test methods and frequencies consistent with requirements of 10 CFR Part 50, Appendix J, Option A (prescriptive requirements) or Option B (performance-based requirements). This TR describes an operational program implementing Option B as stated in Technical Specification Basis B3.6.1.

The CLRT Program using Option B is established in accordance with NEI 94-01, Industry Guidelines for Implementing Performance Based Option of 10 CFR 50, Appendix J, Rev. 0, as modified and endorsed by the NRC in RG 1.163, Performance-Based Containment Leak-Test Program, September 1995.

Schedules for the performance of periodic Type A, B, and C leak rate tests are in accordance with NEI 94-01, as endorsed and modified by RG 1.163, and therefore acceptable.

Option B will be employed by the licensees that choose to implement this TR. Appendix A to this TR completes the program description provided in Section 6.2 of the DCD by identifying the specific test frequencies and test acceptance criteria for containment leakage rate tests. There are no proposed departures from the DCD associated with this supplemental material.

4.0 Conclusion

Based on its review, the staff finds acceptable the proposed report, AP-TR-NS01, Revision 1, which provides the supplemental material needed to fully describe the CLRT Programs for applicants implementing 10 CFR Part 50, Appendix J, Option B, and closes the associated COL Information Item.

cc:

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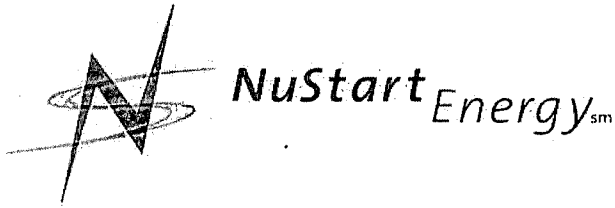
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1.0 INTRODUCTION

The purpose of this Technical Report (TR) is to complete the description of the Containment Leak Rate Test (CLRT) Program for those AP1000 Combined Construction and Operating License (COL) applicants who choose to implement the methodology described herein, and to close COL Information Item 6.2-1. Appendix A to this TR describes a CLRT Program that implements Option B (for performance-based requirements) of 10 CFR Part 50, Appendix J.

COL Information Item 6.2-1 in Revision 15 of the AP1000 Design Control Document (DCD, Reference 1) is found in Section 6.2.6, as follows:

"6.2.6 Combined License Information for Containment Leak Rate Testing

The Combined License applicant is responsible for developing a 'Containment Leakage Rate Testing Program' which will identify which Option is to be implemented under 10 CFR 50, Appendix J. Option A defines a prescriptive-based testing approach whereas option B defines a performance-based testing program."

Pursuant to the DCD, the AP1000 reactor containment, containment penetrations, and isolation barriers are designed to permit periodic leak rate testing in accordance with General Design Criteria 52, 53 and 54. The containment leak rate test system is designed to verify that leakage from the containment remains within limits established in the AP1000 Technical Specifications, DCD Chapter 16. Leak rate testing requirements are defined by 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors," which classifies leak tests as Types A, B and C. The system design provides testing capability consistent with the testing requirements of ANSI-56.8. The system design accommodates the test methods and frequencies consistent with requirements of 10 CFR Part 50, Appendix J, Option A (prescriptive requirements) or Option B (performance-based requirements). This TR describes an operational program implementing Option B as stated in Technical Specification Basis B3.6.1.

2.0 TECHNICAL BACKGROUND

Regulatory Bases

10 CFR 50.54(o) requires that primary reactor containments for water cooled power reactors (except for licensees having permanently ceased operations) be subject to the requirements of 10 CFR Part 50, Appendix J. That appendix sets forth test requirements for preoperational and periodic verification of the leak-tight integrity of the primary reactor containment, and systems and components which penetrate containment of water-cooled power reactors, and establishes the acceptance criteria for such tests. The purposes of the tests are to assure that (a) leakage through the primary reactor containment and systems and components penetrating primary containment shall not exceed allowable leakage rate values as specified in the technical



specifications or associated bases and (b) periodic surveillance of reactor containment penetrations and isolation valves is performed so that proper maintenance and repairs are made during the service life of the containment, and systems and components penetrating primary containment.

10 CFR Part 50, Appendix J describes three types of tests: Types A, B and C. "Type A" testing is intended to measure the primary reactor containment overall integrated leakage rate (1) after the containment has been completed and is ready for operation, and (2) at periodic intervals thereafter. "Type B" testing is intended to detect local leaks and to measure leakage across each pressure-containing or leakage-limiting boundary for certain penetrations, air lock and other door seals, and other components which must meet the acceptance criteria in III.B.3 of Appendix J. "Type C" testing is intended to measure containment isolation valve leakage rates. Two options are available under Appendix J: Option A contains prescriptive requirements, while Option B contains performance-based requirements.

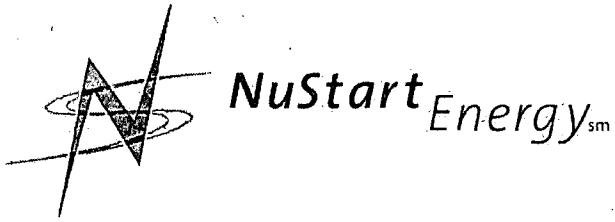
The NRC Staff has concluded that the operational programs discussed in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria" (Reference 3), can be fully described in a COL application. (The COL application would not call for ITAAC for an operational program if the program and its implementation are fully described¹ in a COL application.) The staff is proposing that each COL contain license conditions associated with the timing of implementation for these programs.

AP1000 Design Certification Bases

The AP1000 DCD indicates in Section 6.2.5.1 that the system design accommodates the test methods and frequencies consistent with requirements of Option A or Option B. Subsequent sections of Chapter 6 set forth the design bases, system description, and system operation for the various test types.

Chapter 16 of the AP1000 DCD, in Section 5.5.8, prescribes administrative controls for the conduct of a CLRT program. These controls include: (a) that a program be established in accordance with 10 CFR 50, Appendix J, Option B, as modified by approved exemptions, and the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program" (September 1995) as modified by approved exceptions. Section 5.5.8 also sets forth a number of specific acceptance criteria (e.g., peak internal pressure for design-basis loss of coolant accident, maximum allowable leak rate, etc.).

¹ The Commission defined "fully described" in a May 14, 2004, SRM for SECY-04-0032, "Programmatic Information Needed for Approval of a Combined License Application Without Inspections, Tests, Analyses, and Acceptance Criteria." In this context, "fully described" should be understood to mean that the program is clearly and sufficiently described in terms of the scope and level of detail to allow a reasonable assurance finding of acceptability. Required programs should always be described at a functional level and at an increased level of detail where implementation choices could materially and negatively affect the program effectiveness and acceptability.



Option B will be employed for the licensees that choose to implement this TR. Appendix A to this TR completes the program description provided in Section 6.2 of the DCD by identifying the specific test frequencies and test acceptance criteria for containment leakage rate tests.

Program Implementation

The CLRT Program will be implemented prior to fuel load. This milestone will be reflected in Section 13.4 of the COL applications referencing this TR.

Preoperational Testing

The CLRT program for preoperational testing must be implemented prior to performing the tests. This milestone will be reflected in Section 13.4 of the COL applications referencing this TR.

Periodic Testing

The CLRT program for periodic testing must be fully implemented prior to entry into Mode 4 in accordance with Technical Specifications 3.6.1 and 3.6.2.

3.0 REGULATORY IMPACT

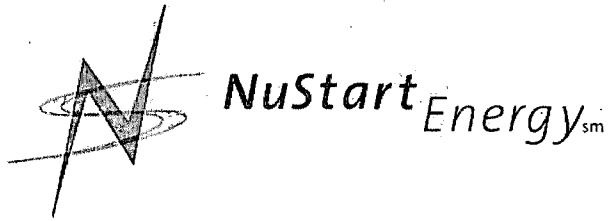
The obligation to describe the CLRT Program is contained in AP1000 DCD Section 6.2.6 (corresponding to COL Information Item 6.2-1), and Section 6.2.6 of NUREG-1793, "Final Safety Evaluation Report [FSER] Related to Certification of the AP1000 Standard Design" (Reference 2). This TR does not affect the DCD or FSER, except in providing the additional information needed to fully describe the CLRT Program.

This TR may be referenced by COL applicants as a basis for fully describing the CLRT program and closing COL Information Item 6.2-1.

There are no proposed departures from the DCD associated with this supplemental material.

4.0 REFERENCES

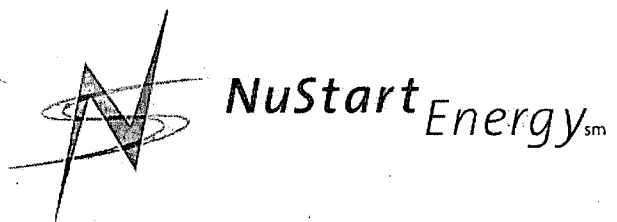
1. APP-GW-GL-700, Revision 15, AP1000 Design Control Document.
2. NUREG-1793, Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design, September 2004.



3. SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," October 28, 2005.

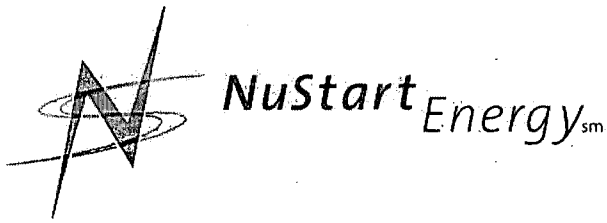
5.0 PROGRAM DESCRIPTION

The CLRT Program description in Appendix A provides the supplemental material needed to fully describe the CLRT Program for applicants implementing 10 CFR Part 50, Appendix J, Option B, and close COL Information Item 6.2-1. The information is presented in the context of the additional information needed for a COL application referencing the certified AP1000 design (and associated Westinghouse Technical Reports). A full program description requires both the system information in subsection 6.2.5 of the AP1000 DCD and the information in the Appendix to this TR.



**NuStart AP-TR-NS01-A
REV 2**

APPENDIX A



Appendix A

AP1000 Containment Leak Rate Test Program Description 10 CFR Part 50, Appendix J, Option B

Design Basis

Leak rate testing requirements are defined by 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors," which classifies leak tests as Types A, B and C. The system design provides testing capability consistent with the testing requirements of ANSI-56.8. The system design accommodates the test methods and frequencies consistent with requirements of 10 CFR Part 50, Appendix J, Option A or Option B. The Containment Leak Rate Test Program using Option B is established in accordance with NEI 94-01 (Reference a), as modified and endorsed by the NRC in RG 1.163 (Reference b).

Scheduling and Reporting of Periodic Tests

Schedules for the performance of periodic Type A, B, and C leak rate tests are in accordance with NEI 94-01, as endorsed and modified by Regulatory Guide 1.163, and described below:

Type A Tests

A preoperational Type A test is conducted prior to initial reactor operation. If initial reactor operation is delayed longer than 36 months after completion of the preoperational Type A test, a second preoperational Type A test shall be performed prior to initial reactor operations. The first periodic Type A test is performed within 48 months after the successful completion of the last preoperational Type A test. Periodic Type A tests are performed at a frequency of at least once per 48 months, until acceptable performance is established. The interval for testing begins at initial reactor operation. Each test interval begins upon completion of a Type A test and ends at the start of the next test. The extension of the Type A test interval is determined in accordance with NEI 94-01.

Type A testing shall be performed during a period of reactor shutdown at a frequency of at least once per 10 years based on acceptable performance history. Acceptable performance history is defined as successful completion of two consecutive Type A tests where the calculated performance leakage rate was less than 1.0 L_a . A preoperational Type A test may be used as one of the two Type A tests that must be successfully completed to extend the test interval, provided that an engineering analysis is performed to document why a preoperational Type A test can be treated as a periodic test. Elapsed time between the first and last tests in a series of consecutive satisfactory tests used to determine performance shall be at least 24 months.



Type B Tests (Except Containment Airlocks)

Type B tests are performed prior to initial reactor operation. Subsequent periodic Type B tests are performed at a frequency of at least once per 30 months, until acceptable performance is established. The test intervals for Type B penetrations may be increased based upon completion of two consecutive periodic as-found Type B tests where results of each test are within allowable administrative limits. Elapsed time between the first and last tests in a series of consecutive satisfactory tests used to determine performance shall be 24 months or the nominal test interval (e.g., refueling cycle) for the component prior to implementing Option B to Appendix J. An extended test interval for Type B tests may be increased to a specific value in a range of frequencies from greater than once per 30 months up to a maximum of once per 120 months. The extension of specific test intervals for Type B penetrations is determined in accordance with NEI 94-01.

Type B Tests (Containment Airlocks)

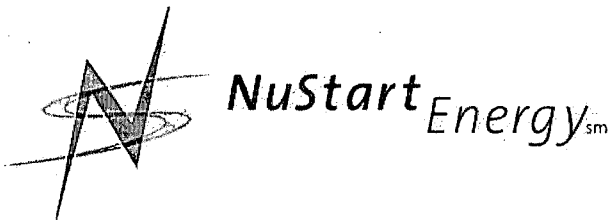
Containment airlock(s) are tested at an internal pressure of not less than P_{ac} ($P_{ac} = P_a$; P_a will be used) prior to a preoperational Type A test. Subsequent periodic tests are performed at a frequency of at least once per 30 months. In addition, equalizing valves, door seals, and penetrations with resilient seals (i.e., shaft seals, electrical penetrations, view port seals and other similar penetrations) that are testable, are tested at a frequency of once per 30 months.

For periods of multiple containment entries where the airlock doors are routinely used for access more frequently than once every 7 days (e.g., shift or daily inspection tours of the containment), door seals may be tested once per 30 days during this time period.

Airlock door seals are tested prior to a preoperational Type A test. When containment integrity is required, airlock door seals are tested within 7 days after each containment access.

Type C Tests

Type C tests are performed prior to initial reactor operation. Subsequent periodic Type C tests are performed at a frequency of at least once per 30 months, until adequate performance has been established. Test intervals for Type C valves may be increased based upon completion of two consecutive periodic as-found Type C tests where the result of each test is within allowable administrative limits. Elapsed time between the first and last tests in a series of consecutive passing tests used to determine performance shall be 24 months or the nominal test interval (e.g., refueling cycle) for the valve prior to implementing Option B to Appendix J. Intervals for Type C testing may be increased to a specific value in a range of frequencies from 30 months up to a maximum of 60 months. Test interval extensions for Type C valves are determined in accordance with NEI 94-01.



Reporting

A post-outage report is prepared presenting results of the previous cycle's Type B and Type C tests, and Type A, Type B and Type C tests, if performed during that outage. The report is available on-site for NRC review. The report shows that the applicable performance criteria are met, and serves as a record that continuing performance is acceptable.

Acceptance Criteria

Acceptance criteria for Type A, B and C Tests are established in Technical Specification 5.5.8.

References

- a. Nuclear Energy Institute Report, NEI 94-01, "Industry Guidelines for Implementing Performance Based Option of 10 CFR 50, Appendix J," Revision 0.
- b. Regulatory Guide 1.163, Performance-Based Containment Leak-Test Program, September 1995.