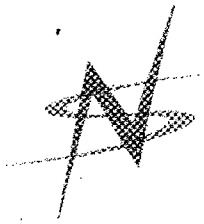

NuStart Energy$_{sm}$

February 19, 2007

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

ATTN: Stephanie Coffin

SUBJECT: NuStart Bellefonte COL Project – NRC Project No. 740
Standard Technical Report Submittal
AP-TR-NS02, *Reactor Vessel Material Surveillance Program*

In support of Combined License application pre-application activities, NuStart Energy, LLC (NuStart) is submitting Revision 0 of AP1000 Standard Combined License Technical Report Number AP-TR-NS02, *Reactor Vessel Material Surveillance Program*. This report completes and documents, on a generic basis, activities required for COL Information Item 5.3-2 in the AP1000 Design Control Document (DCD); it provides a description of the Reactor Vessel Material Surveillance (RVMS) Program for AP1000 Combined Construction and Operating License (COL) applicants. This report also identifies and justifies standard changes to Sections 5.3.2.6.3 and 5.3.6.2 of the AP1000 DCD related to the RVMS Program. The changes identified in Technical Report AP-TR-NS02 are intended to be incorporated into FSARs referencing the AP1000 Design Certification, and may be incorporated into the design certification if 10 CFR Part 52 is revised to permit revision of the design certification.

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 applicants referencing the AP1000 Design Certification.

The purpose for the submittal of this report is to close AP1000 COL Item 5.3-2. This COL item requires the applicant to "address a reactor vessel reactor material surveillance program." It is expected that upon completion of the NRC review of Technical Report AP-TR-NS02, the changes to the DCD identified in this topical report will be considered approved generically for COL applicants referencing the AP1000 Design Certification.

DESIGNATED ORIGINAL PER PM

D079

If you have questions related to the content of Technical Report AP-TR-NS02, please contact Peter Hastings at (980) 373-7820.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 19, 2007.

Sincerely,

Marilyn C. Kray
President

Enclosure: AP-TR-NS02, Revision 0, *Reactor Vessel Material Surveillance Program*

cc: S. D. Bloom, NRC
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Report AP-TR-NS02
Revision 0

Date February 2007

NuStart
AP1000 Standard Combined License
Technical Report

REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM

NuStart Energy Development, LLC 200 Exelon Way, M/S KSA 3-N, Kennett Square, PA 19348

Revision Page

Revision	Date	Description
0	February 2007	Initial issue

1.0 INTRODUCTION

The purpose of this Technical Report (TR) is to provide a description of the Reactor Vessel Material Surveillance Program for those AP1000 Combined Construction and Operating License (COL) applicants who choose to implement the methodology described herein, and close COL Information Item 5.3-2. Appendix A to this TR describes the Reactor Vessel Surveillance Program. The DCD provides a complete program with the exception of reporting requirements and implementation milestones. Accordingly, these two items are addressed by this TR.

COL Information Item 5.3-2 in Revision 15 of the AP1000 Design Control Document (DCD, Reference 1) is found in Section 5.3.6.2, as follows:

"5.3.6.2 Combined License Information Reactor Vessel Material Surveillance Program

> "The Combined License applicant will address a reactor vessel reactor material surveillance program based on subsection 5.3.2.6."

The AP1000 reactor vessel beltline region materials must be periodically tested in accordance with 10 CFR 50 Appendix H requirements to confirm that the materials fracture toughness remains in the ductile region throughout the reactor operating life.

2.0 TECHNICAL BACKGROUND

Regulatory Bases

10 CFR 50 Appendix H, "Reactor Vessel Material Surveillance Program Requirements," defines the monitoring requirements for the reactor vessel beltline materials, the surveillance program requirements, and the reporting of results.

10 CFR 50 Appendix H states that a surveillance program must be established if the end of life peak neutron fluence is expected to exceed 10E17 n/cm^2 (E > 1MeV). Since the end of life fluence is expected to be higher than this threshold, a material surveillance program is required.

The program design and surveillance specimen withdrawal schedule must meet the requirements of ASTM E185-82 "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels." The reactor vessel surveillance program incorporates eight specimen capsules. The capsules are located in guide baskets welded to the outside of the core barrel and positioned directly opposite the center portion of the core.

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 described[1] 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 surveillance program discussed in Section 5.3.2.6 of the AP 1000 DCD complies with the above stated requirements. This section describes the eight capsules (containing specimens, thermal monitors and dosimeters), as well as a recommended withdrawal schedule.

Technical Specification (TS) 3.4.3, RCS Pressure and Temperature (P/T) Limits, requires that heatup and cooldown rates be maintained within the limits of the Pressure and Temperature Limits Report (PTLR). TS 5.6.6.c states that, "The PTLR shall be provided to the NRC upon issuance for each reactor vessel fluency period and for any revision or supplement thereto." The Reactor Vessel Material Surveillance Program described above supports compliance with these requirements.

NUREG–1793 Review

NRC has reviewed AP1000 compliance with 10 CFR 50, Appendix H:

- Section 5.3.2, Reactor Vessel Materials

  In Section 5.3.2.3, Conclusions, the staff states:
  "The staff concludes that the AP1000 RV material specifications, RV manufacturing and fabrication processes, NDE methods of the RV and its appurtenances, fracture toughness testing, material surveillance, and RV fasteners are acceptable and meet the material testing and monitoring requirements of ASME Section III, Appendices G and H of 10 CFR Part 50, and 10 CFR 50.55a, which provide an acceptable basis for satisfying the requirements of GDC 1, 14, 30, 31 and 32."

[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.

- Section 5.3.3.2, Staff Evaluation

  In Section 5.3.3.2, fifth paragraph, the staff states:
  "The staff reviewed the RV materials to ensure that the relevant requirements of GDC 32 have been met as they relate to the provision of a materials surveillance program. Compliance with 10 CFR Part 50, Appendix H, satisfies the requirements of GDC 32 regarding the provision of an appropriate materials surveillance program for the RV. The staff reviewed the RV materials to determine whether they meet the relevant requirements for Appendix H as they relate to determining and monitoring fracture toughness. Section 5.3.2, 'Reactor Vessel Materials', of this report provides the staff's review of the material surveillance program."

Program Implementation

Reactor materials do not begin to be affected by neutron fluence until the reactor begins operation. Accordingly, the Reactor Vessel Material Surveillance Program will be implemented prior to critical operation of the associated reactor. This implementation milestone will be reflected in Table 13.4-1 of Section 13.4 of the COL applications referencing this TR.

3.0 REGULATORY IMPACT

The obligation to describe the Reactor Vessel Material Surveillance Program is contained in AP1000 DCD Section 5.3.6.2 (corresponding to COL Information Item 5.3-2), and Section 5.3.2.4 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 information to close the COL Information Item.

This TR may be used as input to a revision to the DCD, or may be referenced by discrete COL applicants as a basis for the Reactor Vessel Material Surveillance Program and closure of COL Information Item 5.3-2.

There are no proposed departures from Tier 2 that would affect resolution of a severe accident issue identified in the DCD, and there are no changes that have an impact on the Severe Accident Criteria.

Information summarized in this TR will not alter barriers or alarms that control access to the protected areas of the plant. The closure of related COL Information Items will not alter requirements for security personnel. Therefore, this TR does not have an adverse impact on the security assessment of the AP1000.

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

4. 10 CFR 50, Appendix H Reactor Vessel Material Surveillance Program Requirements

5. ASTM E185-82, Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels, 1982

5.0 DCD MARKUP

The Reactor Vessel Material Surveillance Program description in Appendix A to this TR will be used as input to the COL application Final Safety Analysis Report unless the information in this TR is used as input to a future revision to the DCD.

In the event this TR is used as input to a future revision to the AP1000 DCD, the DCD markups provided in Appendix A identify how the AP1000 DCD will be modified.

NuStart AP-TR-NS02
REV 0

APPENDIX A

Appendix A

AP1000 Reactor Vessel Material Surveillance Program

Introduction

The purpose of this Reactor Vessel Material Surveillance Program is to provide the information needed to fully describe the program for monitoring changes in the reactor vessel beltline materials fracture toughness through the end of the plant life as they are being exposed by neutron irradiation and the thermal environment. The information below is presented in the context of the additional information needed in FSAR Section 5.3.2.6 for a COL application referencing the certified AP1000 design.

The following DCD markup identifies how COL Application Final Safety Analysis Reports should be prepared to incorporate the subject change.

Add Subsection 5.3.2.6.3 as follows:

5.3.2.6.3 Report of Test Results

A summary technical report for each capsule withdrawal with the test results is submitted, as specified in 10 CFR 50.4, within one year of the date of capsule withdrawal, unless an extension is granted by the Director, Office of Nuclear Reactor Regulation.

The report includes the data required by ASTM E185-82, as specified in paragraph III.B.1 of 10 CFR 50 Appendix H, and includes the results of all fracture toughness tests conducted on the beltline materials in the irradiated and unirradiated conditions.

If a change in the Technical Specifications is required, either in the pressure-temperature limits or in the operating procedures required to meet the limits, the expected date for submittal of the revised Technical Specifications is provided with the report.

Revise Subsection 5.3.6.2 as follows:

5.3.6.2 Combined License Information Reactor Vessel Materials Surveillance Program

Completed. The Reactor Vessel Material Surveillance Program, which conforms to ASTM E185-82 and 10 CFR 50 Appendix H, is established based on the description provided in Subsection 5.3.2.6.