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Washington, DC 20555-0001

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Dear Mr. Case,

The current requirements for Reactor Vessel Surveillance Programs are contained in 10 CFR 50 Appendix H. Those requirements reference the 1982 ASTM standard, E185-82, as you mentioned in your January 31, 2011 presentation to the ASTM members in Baltimore, MD. ASTM Subcommittee E10.02 has updated E185 several times over the years with the latest version approved in 2010. In fact E185 has been split into two standards. The first standard, ASTM E185-10, provides guidance on the design of a reactor vessel surveillance program, while the second standard, ASTM E2215-10, provides guidance on the post-irradiation testing of reactor vessel surveillance specimens. These two standards were created from the original ASTM E185 in order to separate design and testing to differentiate the surveillance program design reference from the post-irradiation testing requirements. The separation was needed because each plant cites the design basis (i.e., applicable ASTM E185 date) focusing on the conformance basis of the specific program, while Appendix H requires that the post-irradiation testing be performed to ASTM E185-82 to assure adherence to basic testing and reporting requirements. This resulted in confusion in Licensee submittals.

Due to the improvements in the standards, the ASTM E10.02 committee would like to encourage the staff to update 10 CFR 50 Appendix H to reflect the latest international consensus standards as described above especially E185-10 for new plants and E2215-10 for post-irradiation testing for all plants. The ASTM committee is aware that there was an NRC staff effort a few years ago to update 10 CFR 50 Appendix H to the 2002 version of E185 and E2215. ASTM Subcommittee E10.02 encourages additional effort to update to the latest versions (2010) as there have been significant improvements and clarifications.

The attachment provides a description of the significant changes in E185 and E2215. If you have any questions or would like to discuss further, please contact me at halljb@westinghouse.com or ASTM staff manager Joe Koury at jkoury@astm.org.

Thank you,

J. Brian Hall  
Chairman on behalf of ASTM Subcommittee E10.02

Cc: Stuart Richards – RES/DE, John Lubinski – NRR/DCI, Aladar Csontos – RES/DE/CIB, Mark Kirk – RES/DE/CIB, Gary Stevens – RES/DE/CIB, Eric Focht – RES/DE/CIB, Matthew Mitchell – NRR/DCI/CVIB, Carolyn Fairbanks – NRR/DCI/CVIB, Neil Ray – NRO/DE/CIB2

# Summary of Changes to ASTM E 185 and E 2215

## Background

ASTM Subcommittee E10.02 is responsible for the development and maintenance of ASTM standards related to the design and testing of reactor vessel surveillance capsules. The original surveillance programs in the earliest reactor vessels were developed based on ASTM E 185 (1966). The program design and post-irradiation testing requirements evolved with the understanding of neutron embrittlement in pressure vessel steels. In 1973, the original regulatory requirements contained in 10 CFR 50, Appendix H, directly referenced ASTM E 185 (1973), and subsequent revisions to the regulation continued to refer to more recent versions of ASTM E 185. The current requirements for Reactor Vessel Surveillance Programs contained in 10 CFR 50, Appendix H refer to the 1982 version of the ASTM standard, E 185-82.

## Comparison of ASTM E 185-10 and E 185-82

- In 2002, the original ASTM E 185 was split into two separate standards to better manage requirements for the design of new plant programs and testing of capsules from existing programs. (This was done specifically to eliminate the confusion resulting from the requirements in 10 CFR 50, Appendix H with respect to testing versus surveillance program design.) Post-irradiation testing and evaluation requirements, now in ASTM E 2215, were split out from ASTM E 185, limiting the scope of E 185 to surveillance program design requirements.
- Clarifications, additions and refinements were made to Definitions.
- The surveillance capsule withdrawal schedule was modified to simplify its application to a variety of plants while retaining the underlying (original) basis for withdrawal frequency. The schedule was modified.
- Consistent with industry experience, it is no longer requires that HAZ specimens be provided in new surveillance capsules.
- The selection of material for inclusion in the surveillance program is based on the projected transition temperature shift. The prior practice of considering the projected USE decrease for material selection has been discontinued, although the provision to evaluate the USE decrease is retained through the archive material retention requirements.
- The number of Charpy V-notch specimens for inclusion in each capsule has been increased from 12 to 15.

- Fracture toughness test specimens are now required for new plants.
- Limits on lead factor have been modified.

### **Comparison of ASTM E 2215-10 and E 185-82**

- As stated above, in 2002, the original ASTM E 185 was split into two separate standards to better manage requirements for design of new plant programs and testing of capsules from existing programs. Post-irradiation testing and evaluation requirements are now contained in ASTM E 2215.
- The requirement to perform testing of HAZ specimens in existing surveillance capsules has been explicitly excluded consistent with industry experience subsequent to 1982.
- The alternative use of fracture toughness testing was added as an optional test.
- Reporting requirements were refined while retaining all specific items, redundancies with ASTM E 185 were removed, and the Electronic Reporting Requirements section (introduced subsequent to 1982) was removed (obsolete) in the 2010 revision.

### **Comparison of ASTM E 185-10 and E 185-02**

Significant enhancements have been incorporated into the 2010 versions of ASTM E 185 and ASTM E 2215 relative to the 2002 versions:

- In section 3, definitions were added for ‘limiting material’ and ‘standby capsule’; ‘beltline’ definition was clarified; EOL modified to ‘end-of-license’
- In section 5.2.1-5.2.3, required materials that are to be included in the program were clarified; if limiting material is outside the beltline, it must also be included with limiting beltline weld and base metal.
- In section 5.5.2.1, the lead factor recommendation was changed from 1 to 3 to 1.5 to 5 to ensure that the data does lead the reactor vessel.
- In section 5.8.2, required number of capsules was changed from 3-5 to 4-5 based on predicted shift; the withdrawal schedule was simplified and improved:
  - Increased first capsule target fluence because  $5.5E18$  was too low of a fluence (not very relevant) for RVs with a relatively high fluence
  - Simplified and set target fluence as a fraction of EOL ID fluence for all capsules therefore ensuring all capsule fluences are relevant to the RV