The Evolution of Coatings Definitions

Jon R. Cavallo, PE, FASTM
Vice President and Senior Consultant
UESI Underwater Services

Pre-ANSI N5.12

- On June 20, 1974, ANSI N5.12, “Protective coatings (paints) for the nuclear industry,” was issued
- Prior to the issuance of ANSI N5.12 in 1974, definitions for Coating Service Levels 1 and 2 did not exist

ANSI N5.12-1974

- ANSI N5.12-1974 contains the following discussion items:
  - 1.2.1.1 Coating Service Level I pertains to those coating systems, applied to structures, systems, and components, which are essential to the prevention of, or the mitigation of the consequences of, postulated accidents that could cause undue risk to the general public.

ANSI N5.12-1974

- ANSI N5.12-1974 continues:
  - 1.2.1.2 Coating Service Level II applies to those coating systems which are essential to the attainment of the intended normal operating performance.
  - 1.2.1.3 The coating work requirement for Service Level I shall conform to the requirements of this standard. The coating work requirements for Coating Service Level II may be modified from those of Service Level I as covered by the specification.
- USNRC has never formally endorsed ANSI N5.12-1974

ANSI N5.12-1974

- The worst commercial nuclear power plant accident occurred at Three Mile Island Unit 2 starting on March 28, 1979
  - Prior to that time, many people that worked on coatings for nuclear power plant coating systems believed that a plant that suffered an accident could be readily cleaned up and returned to service
  - This is why the definitions of nuclear plant coatings only included those that could directly affect safety-related SSC's (CSL I) and those that could affect the plant economically (CSL II)

ANSI N5.12-1974

- The events of Three Mile Island Unit 2 proved many in the coatings community wrong in their expectations
- The coatings community, specifically ASTM Committee D33, “Protective Coating and Lining Work for Power Generation Facilities,” and the newly-organized Nuclear Utilities Coating Council (NUCC), began work on an expedited basis of guidance document and standards revision based on the lessons learned at Three Mile Island Unit 2

EPRI Guideline on Nuclear Safety-Related Coatings

- The Nuclear Utilities Coating Council (NUCC) also recognized the need for standardization of coating classification terminology and, sponsored by EPRI PSE, began work on “Guideline on Nuclear Safety-Related Coatings”
- As part of this effort, representatives of industry met with USNRC five times during 1997-1998 to ensure that USNRC was fully aware of the progress of the EPRI Guideline Document

Regulatory and Industry Coating and Lining Work Definitions

- Concurrent with the EPRI/NUCC effort, ASTM Committee D33 was proceeding with development and publication of a family of ASTM standards to replace the withdrawn ANSI N5.12, N101.2 and N101.4 standards
- USNRC and Industry recognized that it was imperative that all parties develop and utilize a common set of coating and lining work terminology for all regulatory and technical documents

Regulatory and Industry Coating and Lining Work Definitions

- The EPRI Guideline on Nuclear Safety-Related Coatings, in all revisions starting with the original document issued in April 1998, uses two terms to describe the functionality of coatings and linings – “Safety-Related” and “Non-Safety-Related”
- In 1998, Industry proposed the going-forward use of Safety-Related and Non-Safety-Related in all Regulatory and Industry documents to replace the Service Level terms

Regulatory and Industry Coating and Lining Work Definitions

- This Industry proposal was rejected by USNRC during a meeting held at White Flint in 1999
- As a result of this rejection, ASTM Committee began development of new definitions for Coating Service Levels to be used in ASTM standards and USNRC regulatory documents
- EPRI/NUCC agreed to include these new definitions in its Guideline for reference only

Regulatory and Industry Coating and Lining Work Definitions

- The mutually agreed-to definitions for Coating Service Level were first published concurrently by USNRC in Regulatory Guide 1.54 Revision 1 and by ASTM in D5144-00:
  - Service Level I coatings are used in areas inside the reactor containment where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair safe shutdown

Regulatory and Industry Coating and Lining Work Definitions

- Service Level II coatings are used in areas where coating failure could impair, but not prevent, normal operating performance. The function of Service Level II coatings are to provide corrosion protection and decontaminability in those areas outside the reactor containment that are subject to radiation exposure and radionuclide contamination. Service Level II coatings are not safety-related

Regulatory and Industry Coating and Lining Work Definitions

- Service Level III coatings are used in areas outside the reactor containment where failure could adversely affect the safety function of a safety-related structure, system, or component