

INCEFA-SCALE (INCREASING SAFETY IN NPPS BY COVERING GAPS IN ENVIRONMENTAL FATIGUE ASSESSMENT – FOCUSING ON GAPS BETWEEN LABORATORY DATA AND COMPONENT-SCALE)

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Abstract:

INCEFA-SCALE is a five-year project supported by the European Commission HORIZON2020 programme. It is the successor to the INCEFA-PLUS programme that ran from 2015 to 2020. INCEFA-SCALE kicked off in September 2020. The objective is to continue work, advancing the ability to predict lifetimes of Nuclear Plant components when subjected to Environmental Assisted Fatigue loading (EAF).

It has been generally observed by nuclear plant operators that there appears to be a disconnect between the perceived difficulty of providing an acceptable assessment result with the current EAF methodologies and the good service experience with regard to this specific degradation mechanism. It is internationally recognised that a possible contributor to this discrepancy is the transferability of laboratory-scale tests to real nuclear components. EPRI, in the USA, is leading a series of component-scale environmental fatigue tests that are expected to advance data availability significantly; however, the ability to address transferability of laboratory-scale tests to real component geometries and loadings will still be constrained by limited test data. This is the knowledge gap addressed by INCEFA-SCALE. The project strategy will be (1) the development of comprehensive mechanistic understanding developed through detailed examination of test specimens and MatDB datamining, and (2) testing focussed on particular aspects of component-scale cyclic loading. The project will initially survey and understand the vast amount of test data within JRC's MatDB database (from the predecessor INCEFA PLUS project, and from other external sources such as USNRC, EPRI, MHI and the AdFaM project). In parallel, the test programme needs have been agreed, and protocols agreed for managing data, testing, and material examinations consistently. Testing commenced after one year and will run for three years. Finally, the project will deliver guidance on the use of laboratory-scale data for component-scale applications.

This paper will report the first year of the project and detail the preparations completed to ensure the project maximises the achievement of its objectives.

Keywords: environmentally assisted fatigue, pressurized water reactor, stainless steel



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