PROCEEDINGS PAPER

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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Proceedings of the ASME 2021 Pressure Vessels & Piping Conference (PVP2021)
Virtual Conference, July 13-15, 2021

Paper No.: **PVP2021-61793**; 6 pages
DOI: 10.1115/PVP2021-61793
Published Online: October, 2021 (*expected*)
URL: https://asmedigitalcollection.asme.org/

Abstract:

INCENFA-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 October 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 the number of failure events attributable to EAF is fewer than predicted by the current assessment methodologies. 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 data mining, 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 INCEFAPLUS project, and from other external sources such as USNRC, EPRI, MHI and the AdFaM project). The experimental programme will be specified in the first year and 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 progress in agreeing data gaps, mechanistic understanding needs, and testing requirements.

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

This project has received funding from the Euratom Research & Training programme 2019-2020 under grant agreement N^{o} 945300