

PhD PROPOSAL

CEA – ENSCP (Cadarache, France)

INVESTIGATION OF DEPOSITION MECHANISMS UNDER BOILING: APPLICATION OF FOULING IN PRESSURIZED WATER REACTORS

Abstract:

Nowadays, 85% of the French electricity is produced by nuclear technologies by means of 58 pressurized water reactors. The efficiency of such reactors is based on heat exchange between the primary circuit and the secondary circuit via the steam generator (SG). The SG contains about 3300 tubes in which the primary fluid circulates. These tubes are held in place by spacer plates on which fouling occurs. These fouling phenomena are a serious issue for the operation of the SG as they induce the vibration of the tubes which are responsible for cracking that can lead to tubes breakage.

The Ph-D student will study the influence of the experimental condition (pH, flow rate, pressure, temperature, etc.) on the formation of the deposition by means of the COLENTEC pilot which is representative of the eighth tubes spacer plate where the deposition is the most important in the SG. The deposition will be characterized by using various methods such as SEM, TEM, XRD and XPS. The formation of the deposition will be also correlated with thermohydraulic calculations by means of the CATHARE program developed by a joint effort of CEA, AREVA; EDF and IRSN. This program permits to simulate the thermohydraulic behavior of the primary and secondary circuits of the pressurized water reactors.

The deposition mechanisms responsible for fouling will be deduced from the fine description of the deposition chemistry and the thermohydraulic calculations.

The Ph-D student will have the chance to work with unshed and high-level facilities and equipments.

Location:

Commissariat à l’Energie Atomique (CEA), Cadarache, France.

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To apply, send a CV and a letter of recommendation to Dr. Etienne TEVISSSEN, Dr. Veronique POINTEAU and Dr. Alexandre CHAGNES.

Do not hesitate to contact them if you need more information.

Please, note that this Ph-D can begin by September 2014 (after a two-month background investigation by the French National Security Agency)