RESEARCHES FOR THE DEVELOPMENT OF A DEVICE FOR THE DECOMMISSIONING OF THE HORIZONTAL FUEL CHANNELS IN THE CANDU 6 NUCLEAR REACTOR. FUEL CHANNEL ASSEMBLY

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Abstract: *The scope of this paper is to obtain the needed information on main steps necessary to assembly the fuel channel into calandria of CANDU 6 nuclear reactor. The CANDU fuel channel is essentially the same in all CANDU reactors and it is considered a fundamental building block in the CANDU system and their reliability is crucial to the reactor performance. The fuel channels have a high importance for the operation of CANDU nuclear reactors because they allow new refueling while operating at full capacity. The reactor assembly consists of a hollow cylindrical structure called the calandria assembly, fuel channels and control mechanisms of reactivity. The 380 fuel channels are composed of pressure tubes, made of zirconium-niobium alloy, located inside the calandria tubes, with two end fittings mounted, that are connected by the pipes network of the cooling supply feeders. Each CANDU fuel channel consists of four major components: the pressure tube, the calandria tube, the annulus spacers and the end fittings. The install operations to a new fuel channel must comply with the described requirements from the specified documents by AECL. The main installation operations are the roll expansion of the pressure tube ends into the two end fittings, the welding of the end fittings to the bellows and the installation of the positioning assemblies. Following installation and inspection of all 380 channels, the feeder pipes of the cooling system are connected to the end fittings. After each operation, the resulting information must be recorded in the specific registration and verification documents of each component and each operation. The registration documents, the check documents and the related reports of the fuel channel installation are part of the processes records of the assembly history of the nuclear reactor. All these documents and reports will be archived in order to take anytime a sequential picture of each fuel channel. The radiological safety analyses are made by certified experts for assessment of radiation exposure of workers and public.*

Keywords: *Candu reactor, calandria tube, fuel channel, pressure tube, end fitting, channel closure, shield plug, annulus spacer, positioning assembly.*

1. General Introduction

The install operations to a new fuel channel within a calandria CANDU reactor, must to comply the described requirements in the specified documents by AECL.

The required specifications of the install operations to a new fuel channel are defined by:

- fuel channel installation requirements;
- the general requirements for tools and equipments;
- for welding procedures for structural welding of sealing rings;
- the quality assurance program.

Before installing a new component in the fuel channel, checks should be made of existing parts into the canal, to observe there are in correct position or if there is non-compliance. Before installation is performed