Calandria tube installation Q and A

What is a calandria tube?
The calandria tube (CT) is the outer portion of the fuel channel, which connects to the end fittings and houses the annulus spacers and a pressure tube. The calandria tube, made out of Zircaloy-2, surrounds the pressure tube, and is held apart by rings called annulus spacers (or garter springs) to prevent the two tubes from touching. The space between the two tubes, called annulus, is filled with carbon dioxide gas. The gas is circulated and monitored for the presence of moisture which would indicate a leak in either the pressure tube or the calandria tube.

The CT's main purpose is to provide access through the calandria for the fuel channel assemblies. As well, they insulate the hot fuel channel from the relatively cool heavy moderator water.

Who is involved in installing the calandria tubes?
This is a combined effort between OPG, Aecon and SNC-Lavalin. Work at the reactor face will be completed by boilermakers and millwrights. Also involved in this work series are Quality Control, Radiation Protection and Engineering.

How is it done?
Prior to this work beginning, tube sheet bores, the holes in tube sheet steel face of the reactor through which calandria tubes are fed and secured, were conditioned and cleaned to prepare for installation of CTs. This preparation was aimed at providing an environment conducive to forming a leak-proof joint at either end.

The Canadian-designed CTs are manufactured in Ontario by Cameco. They are prepared in a clean room environment at the Darlington Energy Complex to guard against foreign material, then transported to the Unit 2 airlock 12 at a time in a secure container. Next, they are transported six at a time on a specially-built rack into the vault ready for installation.

Two groups of workers, made up of boilermakers and millwrights, work on the insertion side and one group on the receiving side. This is the first series of work not done remotely for the most part, but rather, by workers at the face of the reactor.

A guiding tool between the two sides receives the CT and assists as it travels to the receiving side. Workers on both sides verify placement.

The guide tool is then removed and the rolling operation, to ensure proper positioning in the bore for a leak-proof joint, is completed.

This occurs 960 times.

How do we know it's been installed correctly?
The work is not done until joint seals have proven to be leak-proof. This is tested by the introduction of a small amount of helium. Because the helium molecule is so tiny, it can get into very small places, and show where any leak may exist.

How long will it take?
This work series is scheduled to take 103 days, wrapping up in October 2018.