Westinghouse Electric Sweden AB
SE-721 63 Västerås
Sweden

Memorandum

To Anders Appelgren

From Per Segerud
Telephone +46 (0)21 347662
Fax +46 (0)21 414190

Date 2010-04-09
Pages 1 of 3

Ref NW 10-014, rev 0
Order No

Abstract

"Westinghouse Experience in using Mechanical Cutting for Reactor Vessel Internals Segmentation"

Per Segerud
Westinghouse Electric Sweden
Västerås, Sweden
Email: segeruph@westinghouse.com
Tel: +46 (0)21 347662

Stefan Fallström
Westinghouse Electric Sweden
Västerås, Sweden
Email: fallstsj@westinghouse.com
Tel: +46 (0)21 347014

Some commercial nuclear power plants have been permanently shut down to date and decommissioned using dismantling methods. Other operating plants have decided to undergo an upgrade process that includes replacement of reactor internals. In both cases, there is a need to perform a segmentation of the reactor vessel internals with proven methods for long term waste disposal. Westinghouse has developed several concepts to dismantle reactor internals based on safe and reliable techniques. The primary and preferred technique is mechanical cutting but Westinghouse has also experience from plasma arc cutting (PAC), abrasive water jet cutting (AWJC) and metal disintegration machining (MDM).

Copy to:

All segmentation projects must be thoroughly planned together with the customer. The radiation level of the internals and complexity of the site work has to be foreseen in all aspects and all procedures and design of advanced tools has to be tested and qualified before the site work starts. The Westinghouse site work includes handling, segmentation and packing activities in accordance with detailed procedures. Before leaving site, the pool environment is restored to the initial condition and all equipment is decontaminated and shipped off site.

All segmentation tools are remotely controlled since the mechanical segmentation projects that Westinghouse has executed, so far, have been performed under water due to the high radiation levels. ALARA and personal safety is the number one priority during the site work. The complexity of the work requires well designed and reliable tools. Westinghouse has optimized the technologies from its experiences accumulated over the years. Its main focus has always been to improve tool handling and cutting speed, water cleanliness, fail-safe and safety aspects. Different band saws, disc saws, tube cutters and shearing tools have been developed to cut the reactor internals. All of those equipments are hydraulically driven which is very suitable for submerged applications.

Mechanical cutting has a number of advantages compared to other cutting techniques.

- The technique produces almost no secondary waste.
- The visibility during cutting is very good because the cutting produces only a negligible amount of micro particles.
- Chips from the cutting process falls down to the bottom of the cutting pool and are easy to collect.
- No gases are produced that can cause airborne contamination.
- The technique is safe and reliable.
- All reactor internal sizes, materials and thicknesses can be cut.

Westinghouse experience in mechanical cutting has demonstrated that it is an excellent technique for segmentation of internals. Westinghouse continues to develop new methods and products in order to further reduce the waste volume.

Mechanical cutting has been used by Westinghouse since 1999 for both PWR’s and BWR’s and its process has been continuously improved over the years. Many of the projects has been performed on the Nordic market, in nuclear power plants such as Forsmark 1, 2 and 3, Oskarshamn 1, 2 and 3 and TVO 1 and 2. Westinghouse has also got three ongoing segmentation projects. These projects

includes steam dryer and core shroud cover segmentation in Forsmark Sweden, steam dryer segmentation in Olkilutoto Finland and segmentation of a PWR reactor pressure vessel with upper and lower internals in Chooz A France.

This paper will describe the sequential steps required to segment, separate, and package the individual components based on these mechanical cutting methods. The paper will also include experiences and lessons learned that Westinghouse have received from past and present projects.