

BARSEBÄCK TEST & MAINTENANCE AND ALARA CENTRE

Carl G Lindvall and Göran Larsson

*Barsebäck Kraft AB Box 524, 24625 Löddeköpinge Sweden
carl-goran.lindvall@barsebackkraft.se
goran.larsson@barsebackkraft.se*

1 INTRODUCTION

This paper describes the possibilities to (re-) use an out-phased NPP for **research, testing and validation of equipment and training of personnel.**

The possibilities to prepare personnel as well as equipment are of most importance to save cost and doses and to raise the level of safety. The possibility to do this in a real NPP environment is very rare. The two shutdown BWR reactors at the Barsebäck site are now prepared and decontaminated and ready to be used for training and research.

With the increasing numbers of New-Build, Up-grade or Life-extension projects the nuclear industry also have an increased need of well educated and trained personnel as well as an increased need for testing and validation of new technologies.

2 POSSIBILITIES AT THE BARSEBÄCK SITE

Since the termination of the operation of Barsebäck NPP (BKAB) in 2005, BKAB has opened the site for research and national training-courses. These possibilities are now also opened for international organisations and companies.

The overriding goals of these activities are to provide possibilities for other companies and organisations to test and validate equipment and work methods in a “real life” environment and to enhance the personnel’s knowledge of safety regulations, work methods and what is expected from them to maintain a good Safety- and ALARA-culture and a good professional performance.

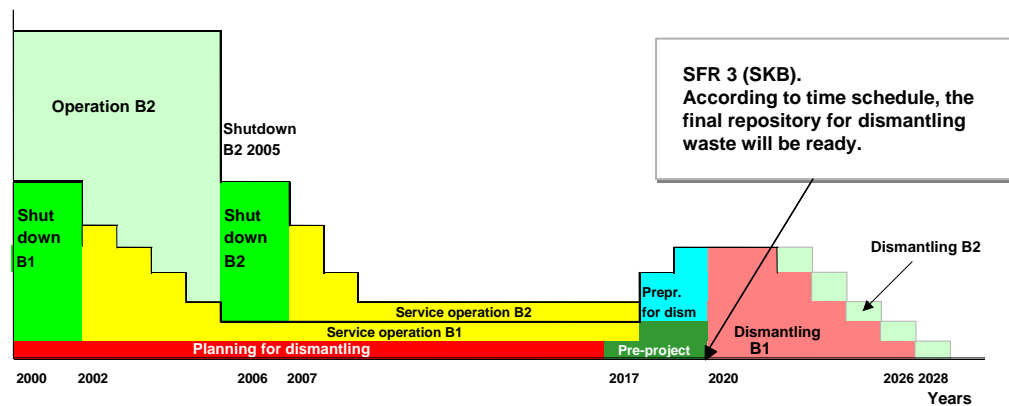
Barsebäck offers 2 NPP:s fully equipped - with more or less total access to all vital parts of the plant. The site has an excellent work environment with low dose rates, even in normally high dose rate areas. Average doserate in the “hot areas” are 0,03 mSv/h. All projects can in principle, have full access to reactor hall, reactor vessel and containment as well as to all other normally closed areas, without problems with contaminations or occupational doses. It’s also possible to take samples from buildings and structures and equipment. Preparation and evaluation can be done on site or in external laboratories. Workshops are available for modifications of equipment, manipulators or preparation of samples

All external projects can be planned and performed with a “free” work time, not in conflict with start up time or critical time-line as for NPPs in operation.

After the forced shut down of the reactors we had to raise, to ourselves, the first questions on what to do and how to tackle the situation.

- In what way can we use the power station, as we are not allowed to operate it?
- For how long time can we use the site?
- What do we need to do to prepare the station and site for any eventual new business?

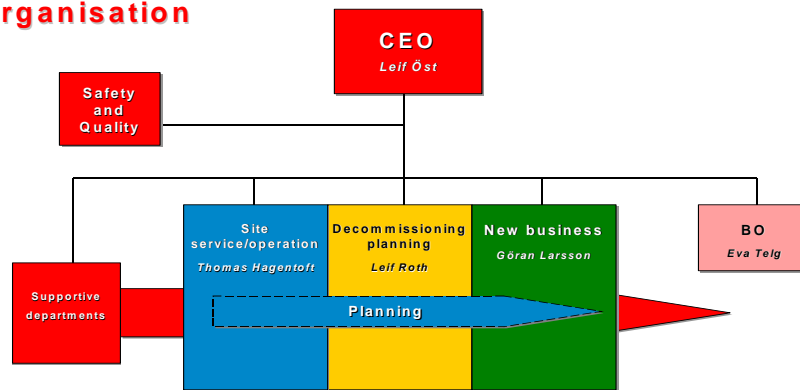
It was first of all decided to follow the original decommissioning and dismantling plan for Barsebäck. The ground for this is that the national storage for waste was planned to be ready according to the technical lifetime of the NPPs. To start the decommissioning before will not be cost or dose efficient. This gives us 10 to 15 years of opportunities to use the site for new purposes.



When this was decided, decision was taken to perform a full system decontamination, to establish good working conditions for the service-operation and to establish low dose rate status in the primary systems to make it possible to use simple techniques for dismantling, demolition and transportation in the future and to enhance the possibilities to establish training and research. It was also decided to adjust the surveillance and electrical systems to be able to replace the Main Control Room with a small, simplified and computerized control system. All surveillance of the plant is now a part of the security personnel's responsibility.

The organisation of Barsebäck has to be adapted to the new situation from an operating organisation of approximately 450 persons to a new organisation of 456 people. The personnel not needed in the new organisation was given a three year job guarantee, most found new jobs directly in the nuclear industry. To co-ordinate all future new business and its development a new team was established, working in parallel with the operational and decommissioning teams. The business development area was given a two-year trial period. The trial period is now over and the result is very positive. As one of the first steps in this new business we invited the Swedish Nuclear Training and Safety Company (KSU) to set up a local organisation to support us in the organisation of the different training courses. KSU has now six employees at the plant and there will be approximately 800 – 1000 participants in their training courses per year.

Organisation



4 EXAMPLES OF ACTIVITIES PLANNED OR PERFORMED

- **Training courses**

- KSU/ National nuclear industry. Training in Workmanship and in Safety culture as well as in specialist training.
- Part of the education of Health Physicists from the University of Lund is done on the BKAB site in cooperation with the plant staff.
- Ongoing development of an Advanced Course on ALARA in Nuclear Installations developed in co-operation between the CEPN and Barsebäck NPP. The first course to be held in spring 2010.

- **Test and validation**

- Testing/training with new NDT-equipment in the RPV by Forsmark and OKG NPP-s.
- Test/training with a “wall climber” planned to be used inside Ringhals NPP containment
- Ongoing discussions with different suppliers of remote tools to be used in fuel pools

- **Research**

- Conmod – test of reactor containment concrete.
- DeSa – an IAEA-project to enhance Decommissioning Safety.
- ELFORSK (Centre for electrical research) in Sweden are analyzing ageing corrosion of containment steel lining.
- Ringhals AB has performed a R&D project in the reactor vessel and also in the moderator tank, analyzing IGSCC and IASCC.
- SSI (Swedish Radiation Protection Authority) and Lund:s University use the site area to test and develop new surface scanning equipments.

- **Re-use of components**

We sell unique NPP components and conventional components to other NPP:s. Such as boron pumps, main circulation pumps, valves, spindles and cones to turbine valves, Diesel generators, Control rods and equipments for reactor tank work.

Just now there are also inquires over feed water pumps, frequency converters and larger electrical motors.

5 **EXAMPLES OF POSSIBLE ACTIVITIES**

- **Test and validation**

- We can offer possibilities to test and validate equipment well in advance for “active use under time pressure”.

- **Research**

- Ageing phenomena. Some international contacts have already been established for the use of Barsebäck NPP:s reactor vessels to analyze ageing phenomena. This area has a large potential for plants that plans for lifetime extension.

- **Re use of components**

- Most “spare parts” are available

- **Training**

- All kinds of on-the-job training

6 **SUMMARY**

We found that the value of the sites possibilities and the personnel’s skills will be an essential part for all the New Build or Life-extension Projects that is rapidly approaching in the horizon.

For all projects a good planning process is most important. It’s also vital not to underestimate the need to practise methods and handling devices before the real project starts. To be able to do this in a real NPP environment without challenging time plans and budgets gives the nuclear industry a new dimension.

From Dusk to Dawn to the future with help of the past

KEYWORDS: ALARA; training; test; validation; optimization; BKAB