

## **How do you know you work ALARA?**

### **ALARA Benchmarking visit at Ringhals and Forsmark nuclear power plants**

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#### **Introduction**

In 2010, the Swedish Nuclear Authority (SSM) performed specific ALARA inspections in all Swedish nuclear power plants and including the Vattenfall-owned Forsmark and Ringhals plants. These inspections aimed to review the organisation of the occupational radiation protection and notably the optimization process.

At this occasion, the Authority raised this question to the utility:

*“How do you ensure that you are focusing on the right areas to keep exposure as low as reasonably achievable (ALARA)?”*

The Vattenfall’s radiation protection network – Rad-NET – reformulated the question in 2011:

*“Are we keeping the doses ALARA? Or could another set of activities, another set of targets/objectives, another focus of ALARA-program, be more efficient and favourable for the occupational doses and radiation fields at our plants?”*

At the initiative of Vattenfall’s Headquarter, an ALARA benchmarking visit was planned with the help of CEPN.

The “ALARA Benchmarking Team” consisted of one representative of Vattenfall (as the initiator and the organiser), the Radiation Protection Managers of Forsmark and Ringhals, and two representatives from CEPN. CEPN brought its experience about the concept and methodologies that govern the ALARA principle. Regarding the practical implementation of

ALARA, two representatives from nuclear power plants known for their good radiation protection results were also invited to participate through the ISOE network ([www.isoe-network.net](http://www.isoe-network.net)). Consequently, the Radiation Protection Managers from Biblis nuclear power plant (Germany) and Sizewell B (United-Kingdom) joined the Team.

It should be noted that this benchmarking exercise is different from others, which are made in other more formal contexts and does not specifically examine the ALARA process (e.g. OSART reviews, etc.). This ALARA Benchmarking could be labelled as a “casual benchmarking with colleagues”!

## **Planning the visit**

### ***The ALARA Evaluation Guide***

An “ALARA Evaluation Guide” has been designed by CEPN to assess the implementation of the ALARA principle in any nuclear power plant. The Guide is divided in six chapters:

- Chapter 1. – On-site radiation protection organization,
- Chapter 2. – Organisation and management of the ALARA Programme,
- Chapter 3. – Work planning and organization,
- Chapter 4. – Factors to be addressed in work preparation (or radiation protection “in the field”),
- Chapter 5. – Work implementation,
- Chapter 6. – Management of feedback.

Most of the questions come from international reviews, good practices reports and guidelines published by IAEA, INPO, ISOE (notably *Work Management to Optimise Occupational Radiological Protection at Nuclear Power Plants*, 2009) and former questionnaires addressed to the French NPP operator *Electricité de France* by CEPN.

Each chapter is divided into topics and sub-topics, with three to four levels of evaluation. Level 1 ensures that minimum ALARA requirements are met, while the other levels assess the organization more deeply and are more focused on the qualitative and subjective implementation of the ALARA principle. A scoring system is also proposed for the evaluation, which can be used to identify on a scoring basis the strong or weak areas.

The Guide can be used for a “self-evaluation” at the plant level. In that case, it should be discussed with the radiation protection staff in close cooperation with stakeholders from other departments (e.g. Maintenance, Logistic, Chemistry, Operation, Planning, etc.) who are already - or could be - involved in the ALARA programmes. This review can favour the identification of weak or strong areas, good practices to be renewed and disseminated or areas of improvement, all being shared by the field staff.

As a result, beside the evaluation process, the ALARA Evaluation Guide can be seen as a list of successful procedures and current good practices from various origins that have proved

their efficiency to optimize the radiation protection and perform stronger involvement and empowerment of workers.

***Scheduling and performing the visit***

The ALARA Evaluation Guide was sent in January 2014 to Forsmark and Ringhals nuclear power plants. Both plants performed a separate self-evaluation and choose four topics from the ALARA Evaluation Guide that would fit to their current particular points of interest.

The ALARA Benchmarking Team spent two days on each plant (3-4 March 2014 in Forsmark, 5-6 March 2014 in Ringhals). The days were divided into one-hour meetings, each meeting devoted to an interview with different kinds of employees: one meeting with Department managers, one meeting with Job Planners, etc. (see Table 1). This approach encourages discussions, *which are not topic related, but related to specific roles and functions*. The ALARA Benchmarking Team conducted the discussions, with the aim of evaluating the understanding, knowledge and attitude of the interviewees on the four topics chosen by the radiation protection personnel. Interviewees were encouraged to speak freely and formulate suggestions and areas of improvement. In addition to the meetings, a visit to the controlled area was planned in each plant (see Table 1). The goal was to assess the practical implementation of the plants’ ALARA programs as well as to identify good practices and ways of improvement.

**Table 1.** – Activities during the benchmarking

Interviews	Visit into the plant
<ul style="list-style-type: none"> <li>• Senior management</li> <li>• Supervisors various departments: Modification and project, Chemical, Planning, ...</li> <li>• Radiation protection staff (utility + contractors)</li> <li>• Job planners</li> <li>• Maintenance</li> <li>• Contractors</li> </ul>	<ul style="list-style-type: none"> <li>• Reactor building (BWR)</li> <li>• Decontamination facility</li> <li>• Waste management</li> <li>• Mock-up building</li> </ul>



**Figure 1.** – The ALARA Benchmarking Team at Forsmark nuclear power plant.

## **Results of the benchmarking**

Forsmark and Ringhals nuclear power plants have both shown a very good work management organisation to optimise the radiological protection of their workers. Indeed, the ALARA Benchmarking Team has identified several good practices in the organisation of the two plants. These good practices are related to a large array of issues: specific radiation protection training; devices used for monitoring the source term; mock-up installation; etc. The ALARA Benchmarking Team was particularly impressed by the good radiation protection knowledge of workers at Forsmark NPP and by the distribution of ALARA responsibilities among all Departments at Ringhals NPP.

With the help of the ALARA Evaluation Guide and the visits, areas of improvement have been identified (formalized in the report of the visit). To address these, suggestions have been formulated by the ALARA Benchmarking Team and by the interviewees. For example, the Team suggested a deeper involvement of contractors in the optimization process or the creation of small ALARA technical groups dedicated to specific jobs.

### ***Many indirect contributions***

Other additional contributions to the benchmarking process are worth noting, as follows:

*Before the benchmarking:* The ALARA Evaluation Guide was analysed by the radiation protection staff. According to the Ringhals radiation protection section “*one can always find new ideas to implement in the Guide*”. Implementing the Guide was also an excellent opportunity for radiation protection section to get in touch with other sections.

*During the benchmarking:* The ALARA Benchmarking gathered in total almost 100 persons at Forsmark and Ringhals. Some of these people do not frequently work with radiation protection staff or deal with ALARA issues in their job. This benchmarking also helped to reveal and diffuse ALARA issues among numerous sections.

*After the benchmarking:* To favour worker empowerment in radiation protection, a feedback (summary) of the report of the visit should be distributed to the interviewees and the workers. The second step is to communicate to workers about the implementation of some of the suggestions.

## **Conclusion**

This benchmarking was unusual on several levels:

- its topic was entirely based on the ALARA principle,
- a specific ALARA Benchmarking Team was constituted, gathering radiation protection colleagues from different plants in Europe,
- a specific document (ALARA Benchmarking Guide) was drafted for the occasion,

Beside the identification of good practices and areas of improvement at the local and corporate levels, such a benchmarking is a powerful tool to disseminate and diffuse radiation protection and ALARA culture among the various departments of a nuclear power plant.

## **Acknowledgement**

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The Benchmarking Team is eager to perform benchmarking in other installations!