

## **SUSTAINABLE IMPLEMENTATION OF ALARA PRINCIPLE AT KOZLODUY NPP**

### **ABSTRACT**

*The paper describes some new key elements in the optimization of the radiation protection at NPP Kozloduy (KNPP). The achievements of excellence in radiation protection are considered as a goal of two parties - management commitment and consistent support and worker's acceptance and involvement. The consequences of the practical implementation on some ALARA principles are presented in support of the conclusions.*

### **INTRODUCTION**

The report presents elements of sustainable approach introduced in the last couple of years in the radiation protection (RP) programme at NPP Kozloduy. We consider the achievements of excellence in radiation protection as goal of two parties - management commitment and consistent support and worker's acceptance and involvement. In the KNPP's Safety Policy there is a statement of the Executive Director that efforts to promote high standards of safety, including dose reduction and safety culture have priority against the electricity production.

The understanding we want to provide to the first and second line management is that high level of radiation protection performance can not be achieved solely by the activities of the RP staff but by integrating ALARA into the operation and maintenance of the station by all personnel. Furthermore we consider that effective radiation protection strategy requires similar effective safety culture and last but not least the human performance as involvement of the individuals to contribute to the safe and reliable operation and maintenance of the units.

### **PRINCIPLES FOR IMPROVING RADIATION PROTECTION**

For some time past we at KNPP started to organize our work in the radiation protection field within a frame of some basic principles:

- Plant personnel should be made aware of management commitment to keep occupational exposures as low as it is reasonable achievable;
- Management should periodically perform a formal audit to determine how exposures might be lowered;
- The radiation protection staff should be encouraged to look for ways of reducing exposures;
- Management of second and third lines have to find ways to improve Safety Culture of the personnel always taking into account the Human Factor;
- Operational feedback should be used as a practical and powerful tool.
- Best international practices and benchmarking are to keep us up-to-date.

### **KNPP APPROACH**

In the new organization of KNPP there is a Nuclear Safety and Radiation Protection Department, responsible for the safety performance of the company. Power production enterprises (PP: units 1-4 and units 5,6) have in their structure radiation protection sections.

The approach presented here is enforced mutually by all RP structures. Generally the radiation risk is assessed in every single radiation work permit (RWP). Along with the standard RP measures in the radiation controlled area (RCA) as: shielding, posting, fencing, labeling, and time limitation, the following specific organizational and technical measures were developed and implemented:

- ALARA committee with approved rules was established. The committee on ALARA is headed by the chief engineer or his deputy. The head of radiation protection section and all maintenance managers are permanent members.
- Tasks codes during outages were established. The software for the dose management when entering the RCA accepts the task code in order to get later dose distribution per task;
- Instruction for implementing the ALARA principle was developed and implemented. It gives important practical guides and indicators to be observed by the personnel during maintenance activities. Some examples are listed below:
- an ALARA briefing is conducted if the expected collective dose is 4 man.mSv;
  - each group of workers is instructed and if needed an ALARA checklist is filled out before work starts;
  - the ALARA committee is entitled to hand in an ALARA diploma together with financial rewarding for achievements in keeping doses low during outages;
  - Always when any indicator exceeds 20 % of its level the ALARA committee has to analyze the issue and give recommendations;
  - New type of portal monitors to control the contamination of the body were installed at the exit of the restricted area along with measuring chambers to monitor the contamination of tools and instruments;
  - Dose budgets for not planned maintenance works, for each unit's outage and for the annual collective dose are discussed and justified on ALARA meetings;

In the area of "safety culture" and "human performance" the following was implemented:

- a system was established for the plan personnel to report ALARA suggestions periodically collected and passed on to the ALARA committee;
- ethical code of the radiation protection personnel was established with 10 statements and the signature of the staff on it;
- "Remember" materials/cards were developed to increase the attitude to the safety and the responsibility of everyone while performing any activity (so called STAR principle). The abbreviation **STYL(E)** was introduced with each letter meaning ( as the Bulgarian word): **S**- self assessment and corrective action, **T** – for adherence to procedures, **Y**- for initiative and professional, **L** - for personal responsibility.
- Education in training center concerning ALARA

Late in 2009 or in 2010 it is planned to locate large monitors at suitable places with information in regard to safety indicators, maps with gamma dose rate and miscellaneous. The information will be up-to date and also available on PC monitors. We want to involve every worker, so that the goals of the station became his goals. We think that ALARA approach is close related with the safety culture of the workers.

Feedback is quite essential for good results. We rely and take advantage from:

International experience and benchmarking:

- ◆ ISOE data,
- ◆ WANO data
- ◆ ALARA Forum and Symposiums

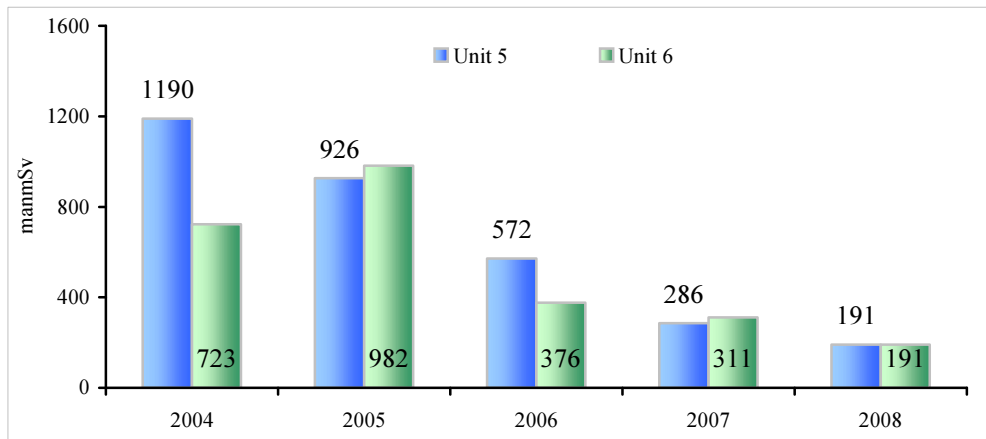
Operational experience:

- ◆ Dose register
- ◆ Event analyses
- ◆ Reports

#### SOME DATA OF COLLECTIVE DOSE AT KNPP

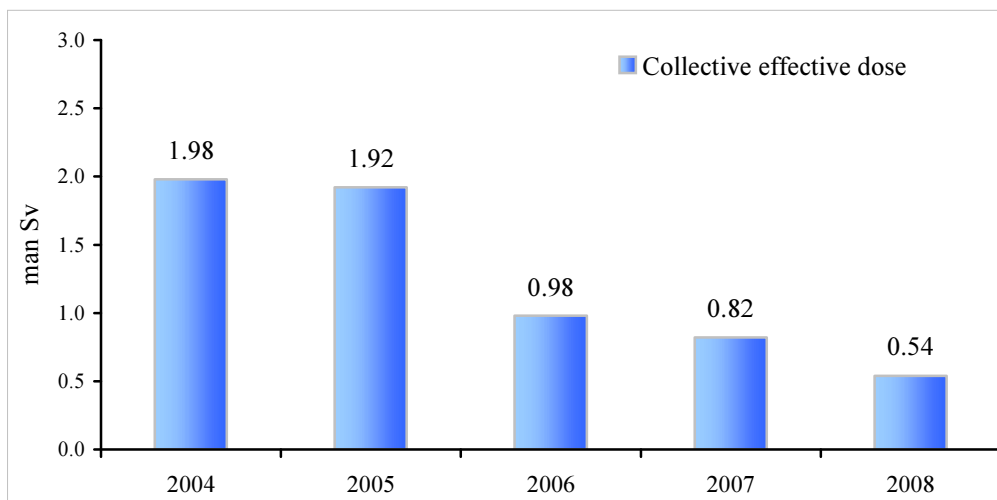
The most important indicator of sustainable ALARA implementation is the collective dose trend. Some data from the operation of units 5 and 6 at KNPP are presented below.

Collective dose [man.mSv] during outages (refueling) at EP-2 in the period 2004 ÷ 2008



*Collective dose at EP-2 during outages*

№	Indicator	2004	2005	2006	2007	2008
1	Collective effective dose [manmSv]	1976.89	1916.62	983.84	818.74	536.96
2	Collective dose from external exposure [manmSv]	1973.05	1911.13	983.84	818.74	536.96
3	Collective dose from internal exposure [man.mSv]	3.84	5.49	0	0	0



As a result of the efforts mentioned above, the dose exposure of the personnel was significantly reduced. The trends of the above figures are clear enough.

## CONCLUSIONS

The BNSA (Regulatory body of Bulgaria) recognized the great effort and progress that the plant has done in the radiation protection area and particularly to instill the ALARA philosophy in plant personnel. Indicators of collective dose achieved by KNPP (units 5 and 6) are showing decrease from 2 man.Sv to about 0.54 man.Sv from the year 2004 to the year 2008.

We believe the RP staff and the management are on the right way of good radiological performance.

## THE FUTURE

We don't want that progress towards improving radiological performance undergo stagnation. That is why we are very cautious of warning flags indicating some declining trends. We are aware of the many other problems in regard to radiation protection optimization as budget, retirements, reorganizations, reconstruction and modernization of facilities. We want to stay "Learning Organization" - to remember lessons learned from the past and best practices.

We are saying to our staff: "We are not the best", "We still need to improve if standards are set higher", "There is always a risk of incidents".

The future of good radiological performance is not guaranteed, so we are challenged all the time.