

SUSTAINABLE IMPLEMENTATION OF ALARA PRINCIPLE AT KOZLODUY NPP

- ◆ The main Question: How to implement effectively ALARA? –
Three pillars:
 - The Thinking ALARA;
 - Tools;
 - Feedback;
- ◆ 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.
 - High level of safety culture
 - Excellent human performance

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◆ The Thinking

- High level of safety culture
- Excellent human performance

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 encourage 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.

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

- ◆ a system was established for the plant 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 centre about ALARA

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Tools:

- ◆ 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;

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Tools (continued):

- ◆ each group of workers is instructed (pre-job briefing) 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;

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Feedback :

International experience and benchmarking:

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

Operational experience:

- ◆ Dose register
- ◆ Event analyses
- ◆ Reports

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FEEDBACK:

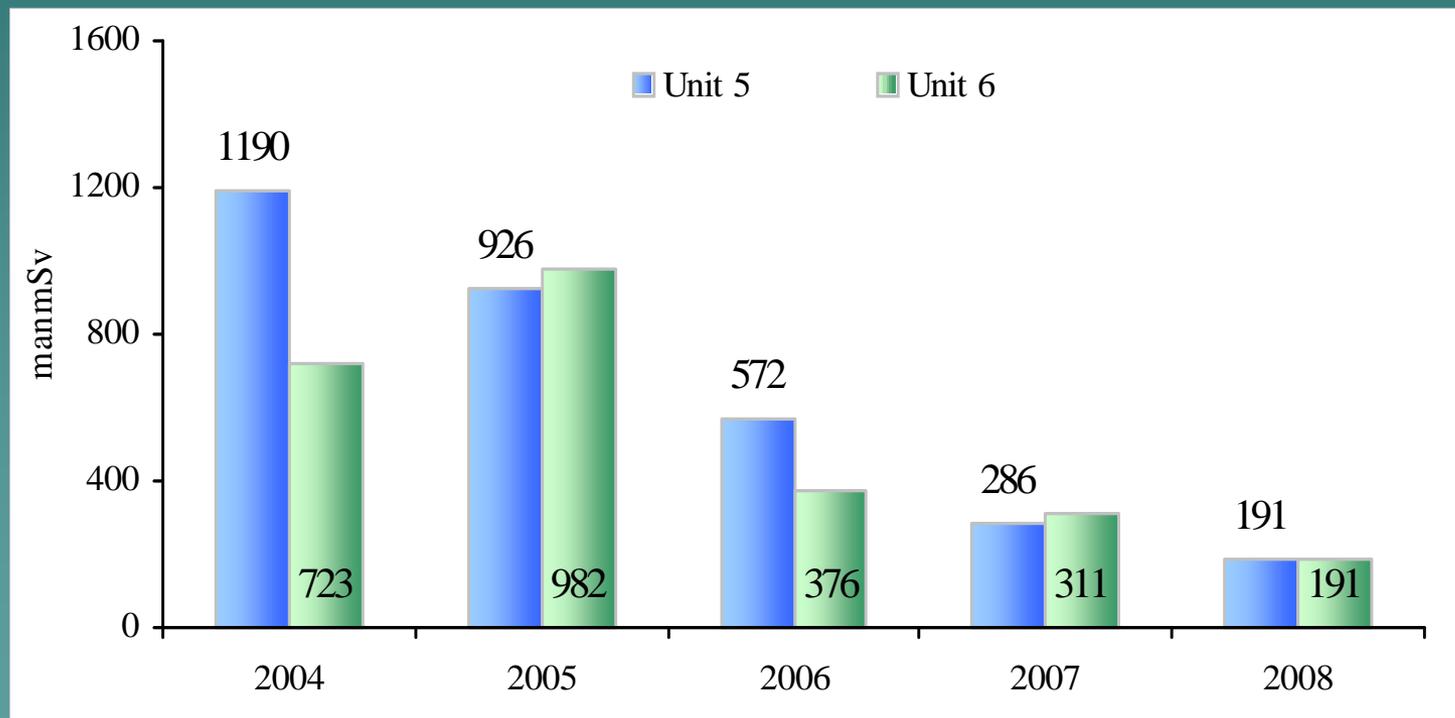
Collective effective dose for units 5 and 6 for the period 2004÷2008.

Year	2004	2005	2006	2007	2008
Dose [manmSv]	1976.89	1916.62	983.04	818.74	536.96

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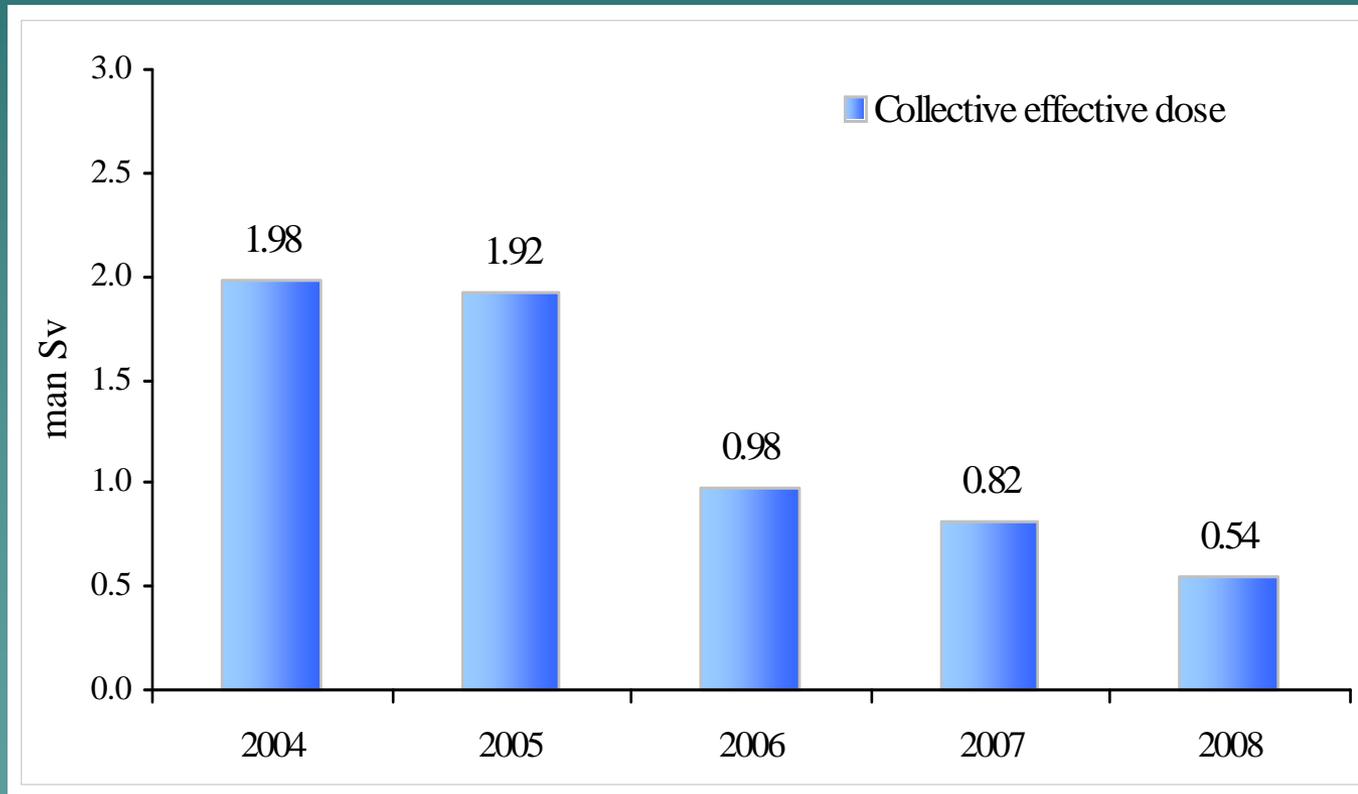
Feedback:

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



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- ◆ Trend of Collective effective dose at KNPP in 2004-2008



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CONCLUSIONS

- ◆ Look always for warning flags analyzing the 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”.
- ◆ We understand that the future of good radiological performance is not guaranteed, so we are challenged all the time.

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Without RP Tools ? Quite difficult to compensate and drive forwards!

