

## INTRODUCTION AND MAIN CONCLUSIONS

### INTRODUCTION

At the request of the government of the Bulgaria, an IAEA Operational Safety Review Team (OSART) of international experts visited Kozloduy Nuclear Power Plant from 26 November to 13 December 2012. The purpose of the mission was to review operating practices in the areas of Management organization and administration; Training and qualification; Operations; Maintenance; Technical support; Operating experience feedback, Radiation protection; Chemistry and Emergency planning and preparedness. In addition, an exchange of technical experience and knowledge took place between the experts and their plant counterparts on how the common goal of excellence in operational safety could be further pursued.

The Kozloduy OSART mission was the 174<sup>th</sup> in the programme, which began in 1982. The team was composed of experts from Belgium, Canada, Czech Republic, Finland, Germany, Hungary, Slovakia, Sweden, Ukraine and UK, together with the IAEA staff members and an observer from Russia. The collective nuclear power experience of the team was approximately 350 years.

The Kozloduy NPP is located in the North-West part of Bulgaria at about 3 km from the Danube River, 3.5 km to the South-East of the town of Kozloduy, and 180 km to the North of Sofia. The plant currently has two 1000 MW units (type WWER-1000/V-320) in operation. Unit 5 was first connected to the grid in 1987 and unit 6 in 1991. These two units and the site auxiliary systems needed for their operation were the scope of the OSART mission.

Before visiting the plant, the team studied information provided by the IAEA and the Kozloduy plant to familiarize themselves with the plant's main features and operating performance, staff organization and responsibilities, and important programmes and procedures. During the mission, the team reviewed many of the plant's programmes and procedures in depth, examined indicators of the plant's performance, observed work in progress, and held in-depth discussions with plant personnel.

Throughout the review, the exchange of information between the OSART experts and plant personnel was very open, professional and productive. Emphasis was placed on assessing the effectiveness of operational safety rather than simply the content of programmes. The conclusions of the OSART team were based on the plant's performance compared with good international practices.

The following report is produced to summarize the findings in the review scope, according to the OSART Guidelines document. The text reflects only those areas where the team considers that a Recommendation, a Suggestion, an Encouragement, a Good Practice or a Good Performance is appropriate. In all other areas of the review scope, where the review did not reveal further safety conclusions at the time of the review, no text is included. This is reflected in the report by the omission of some paragraph numbers where no text is required.

## MAIN CONCLUSIONS

The OSART team concluded that the managers of Kozloduy NPP are committed to improving the operational safety and reliability of their plant. It was clearly demonstrated by the systematic approach of the plant in the implementation of measures aimed at achieving and maintaining the high standards of nuclear industry.

The team found good areas of performance, including the following:

- combined use of ethanolamine and ammonia for secondary side chemistry control, which significantly reduces the corrosion rate in the secondary circuit;
- the plant developed procedures for using redundant sources of electrical power, these procedures and associated equipment were tested and validated during emergency exercise;
- the plant performs independent measurement of fuel assembly enrichment to verify that fuel assemblies are manufactured in compliance with design specifications;
- color coding of labels of spare parts and materials which makes a distinct identification of items requiring special attention (i.e. intended for equipment important to safety, or with limited shelf-life).

A number of proposals for improvements in operational safety were offered by the team. The most significant proposals include the following:

- the plant should justify the current method of operation of the systems for mechanical filtration of drain water and for temporary storage of liquid waste and reflect it in the operating procedures;
- the plant should develop and implement severe accident management guidelines for both open reactor conditions and the spent fuel pools;
- the plant should consider strengthening the quality of the root-cause analysis connected to human performance so that the analysis is carried out in a thorough and timely manner;
- the plant should consider reinforcing the contamination control practices in order to minimize the spread of contamination and the risk of internal contamination;
- the plant should perform dose assessment for neutron radiation and develop appropriate procedure for this assessment for everyone working in neutron fields.

Kozloduy management expressed a determination to address the areas identified for improvement and indicated a willingness to accept a follow up visit in about eighteen months.