## EXECUTIVE SUMMARY

This report describes the results of the OSART mission conducted for Unit 4 of Beloyarsk Nuclear Power Plant, in the Russian Federation from 6 to 23 November 2023.

The purpose of an OSART mission is to review the operational safety performance of a nuclear power plant against the IAEA safety standards, make recommendations and suggestions for further improvement and identify good practices that can be shared with NPPs around the world.

This OSART mission reviewed nine areas: Leadership and Management for Safety; Training and Qualification; Operations; Maintenance; Technical Support; Operating Experience Feedback; Radiation Protection; Chemistry; and Accident Management. However, there was no dedicated chemistry reviewer, so the review of the chemistry area was partially undertaken by the other team members.

The mission was coordinated by an IAEA Team Leader and Deputy Team Leader and the team was composed of experts from Armenia, Belarus, China and the Islamic Republic of Iran and two IAEA staff members and three observers from the Russian Federation. The collective nuclear power experience of the team was approximately 270 years.

The team identified five issues and all were suggestions. One good practice was also identified.

The area of good practice was:

– The plant utilized a special connection for the sampling of gases from reactor circuits which minimizes the potential for impurities to impact the gas analysis whilst ensuring that the gas did not escape into the work area.

The most significant issues identified were:

– The plant should consider enhancing the basis of accident management programme to include the full range of beyond design external hazards for all modes and states of operation and all fuel locations on site.

– The plant should consider enhancing the scope Level 1 and Level 2 Probabilistic Safety Analysis (PSA) to cover all operational modes, all fuel locations on site as well as all external hazards unique to the site.

– The plant should consider improving the effectiveness of field operator rounds to identify deficiencies and adverse conditions to ensure safe and reliable operation of plant structures, systems and components.

Beloyarsk management expressed their commitment to address the issues identified and invited a follow up visit in about eighteen months to review the progress.

# INTRODUCTION AND MAIN CONCLUSIONS

## INTRODUCTION

At the request of the government of the Russian Federation, an IAEA Operational Safety Review Team (OSART) of international experts visited Beloyarsk Unit 4 Nuclear Power Plant from 6 to 23 November 2023. The purpose of the mission was to review operating practices in the areas of Leadership and Management for Safety, Training and Qualification, Operations, Maintenance, Technical Support, Operating Experience Feedback, Chemistry, Radiation Protection, and Accident Management. However, there was no dedicated chemistry reviewer, so the review of the chemistry area was partially undertaken by the other team members.

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 Beloyarsk Nuclear Power Plant is located at Zarechny, Sverdlovsk region which is part of the Ural Federal District, 1800 km east of Moscow in the Russian Federation. The plant is owned by ROSATOM State Atomic Energy Corporation and operated by Beloyarsk NPP which is a branch of Rosenergoatom Joint Stock Company. The Beloyarsk plant consists of four units with two Light Water Graphite Reactors (LWGR) permanently shut down and two Fast Breeder Reactors with reference output of 600 and 885 MWe gross. The Beloyarsk Unit 4 NPP employs approximately 984 staff.

The Beloyarsk OSART mission was the 221$^{st}$ in the programme, which began in 1982. The team was composed of experts from Armenia, Belarus, China and the Islamic Republic of Iran, and four IAEA staff members and three observers from the Russian Federation. The collective nuclear power experience of the team was 270 years.

Before visiting the plant, the team studied information provided by the IAEA and the Beloyarsk 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 the Beloyarsk NPP are committed to improving the operational safety and reliability of their plant.

The team found an area of good practice:

- The plant utilized a special connection for the sampling of gases from reactor circuits which minimizes the potential for impurities to impact the gas analysis whilst ensuring that the gas did not escape into the work area.

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

- The plant should consider enhancing the basis of accident management programme to include the full range of beyond design external hazards for all modes and states of operation and all fuel locations on site.
- The plant should consider enhancing the scope Level 1 and Level 2 PSA to cover all operational modes, all fuel locations on site as well as all external hazards unique to the site.
- The plant should consider improving the effectiveness of field operator rounds to identify deficiencies and adverse conditions to ensure safe and reliable operation of plant structures, systems and components.

Beloyarsk management expressed their commitment to address the issues identified and invited a follow up visit in about eighteen months to review the progress.