EXECUTIVE SUMMARY

This report describes the results of the Pre-operational OSART (Pre-OSART) mission conducted at Olkiluoto Nuclear Power Plant Unit 3, Finland from 5 – 22 March 2018.

The purpose of a Pre-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 eleven areas: leadership and management for safety; training and qualification; operations; maintenance; technical support; operating experience feedback; radiation protection; chemistry; emergency preparedness and response, accident management and commissioning.

The mission was coordinated by an IAEA Team Leader and Deputy Team Leader and the team was composed of experts from Belgium, China, France, the United Kingdom, the United States of American and the IAEA staff members. The collective nuclear power experience of the team was 285 years.

The team identified 18 issues, resulting in 11 recommendations, and 7 suggestions. 3 good practices were also identified.

Several areas of good practices were noted:

- The plant has developed and implemented an efficient system for improving knowledge and skills of the personnel.
- The plant has developed and validated a unique method for performing a visual suspended solids analysis using a microscope and camera combination.
- The plant has introduced a system for systematic Nuclear Safety Culture assessments within the supplier organization during construction and commissioning.

The most significant issues identified were:

- Plant expectations are not being consistently set and reinforced in the field by the plant leadership.
- Plant operations do not always have full control of the status of the plant systems and components related to safety.
- The plant Foreign Material Exclusion (FME) programme is not rigorously implemented to prevent foreign material from being introduced into systems and components related to safety.

Olkiluoto NPP management expressed their commitment to address the issues identified and invited a follow up visit to Unit 3 in about eighteen months to review the progress.

INTRODUCTION AND MAIN CONCLUSIONS

INTRODUCTION

At the request of the government of Finland, an IAEA Preoperational Safety Review Team (Pre-OSART) of international experts visited Olkiluoto 3 Nuclear Power Plant from 5 to 22 March 2018. 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, radiation protection, chemistry, emergency preparedness and response, accident management and commissioning. 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 Olkiluoto Nuclear Power Plant is located on the Olkiluoto Island in the municipality of Eurajoki in western Finland, 240 km northwest of Helsinki on the shore of the Gulf of Bothnia. Unit 3 (OL3) is an Evolutionary Pressurized Water Reactor (EPR) unit that includes modern proven technology and advanced new safety features. The reactor has a gross thermal power of approximately 4500 MW, supplying steam to a single turbine generator with a net electrical capacity of 1600 MW.

Teollisuuden Voima Oyj is a non-listed public limited liability company. TVO's majority shareholder is Pohjolan Voima Oy with a 58,5 % shareholding in TVO. The other owner companies are EPV Energia Oy, Fortum Power and Heat Oy, Loiste Holding Oy, Kemira Oyj and Oy Mankala Ab.

The plant status at the time of the pre-OSART mission was as follows:

- Cold functional testing was completed in June 2017,
- The containment leak tightness test was completed in February 2014,
- Hot functional tests started in December 2017 and were in progress at the time of the mission.

The Olkiluoto 3 NPP Pre-operational OSART (Pre-OSART) mission was the 201st in the programme, which began in 1982. The team was composed of experts from Belgium, China, France, the United Kingdom, the United States of America together with the IAEA staff members and an observer from The Netherlands. The collective nuclear power experience of the team was 285 years.

Before visiting the plant, the team studied information provided by the IAEA and the Olkiluoto 3 plant to familiarize themselves with the plant's main features and performance during the preoperational phase, 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 Pre-OSART team were based on the plant's performance during the preoperational phase compared with the IAEA Safety Standards.

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 Pre-OSART team concluded that the managers of the Olkiluoto 3 NPP are committed to improving the operational safety and reliability of their plant. Several areas of good practices were noted, including the following:

- The plant has developed and implemented an efficient system for improving knowledge and skills of the personnel.
- The plant has developed and validated a unique method for performing a visual suspended solids analysis using a microscope and camera combination.
- The plant has introduced a system for systematic Nuclear Safety Culture assessments within the supplier organization during construction and commissioning.

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

- Plant expectations are not being consistently set and reinforced in the field by the plant leadership.
- Plant operations do not always have full control of the status of the plant systems and components related to safety.
- The plant Foreign Material Exclusion (FME) programme is not rigorously implemented to prevent foreign material from being introduced into systems and components related to safety.

Olkiluoto 3 NPP 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.