

INTRODUCTION AND MAIN CONCLUSIONS

INTRODUCTION

At the request of the Government of Brazil, an IAEA Operational Safety Review Team (OSART) of international experts visited Angra 1 Nuclear Power Plant (NPP) from 20 August to 6 September 2012. The purpose of the mission was to review operating practices in the areas of Management Organization and Administration; Operations; Maintenance; Technical support; Radiation Protection; Operating Experience; Chemistry and Accident Management. 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 Angra 1 OSART mission was the 168th in the programme, which began in 1982. The team was composed of experts from France, Germany, Hungary, Pakistan, Slovakia, Sweden, United Kingdom, the IAEA staff members and observers from Bulgaria and Mexico. The collective nuclear power experience of the team was approximately 370 years.

The Angra 1 NPP was designed by Westinghouse and constructed by Brazilian companies, under Westinghouse supervision and responsibility. The nuclear steam supply system is two loop Pressurized Water Reactor (PWR), Westinghouse design. Electrical output of the plant is 640 MWe. The plant is located on the coast of the Atlantic Ocean, in the province of Angra dos Reis (southeast of Brazil), between the cities of Angra dos Reis and Paraty, 220 Km from Sao Paulo and 130 Km from Rio de Janeiro.

Before visiting the plant, the team studied information provided by the IAEA and the Angra 1 NPP 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 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 the IAEA Safety Standards.

The following report is produced to summarize the findings in the scope of the review, according to the OSART Guidelines. 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 Angra 1 NPP are committed to improving the operational safety and reliability of their plant. The team found good areas of performance, including the following:

- All Managers are obtaining and retaining at least Cold (Inactive) Operator Licenses as Shift Supervisor, which means that they undergo the entire training and evaluation as a Shift Supervisor, including Simulator Training, and routine re-training.
- The plant is using special software tool for planning, trending and follow-up of the plants surveillance program.
- The plant is utilizing an efficient weekly assessment of maintenance activities using experience feed-back.
- The plant has an accredited thermoluminescence dosimetry laboratory.
- The secondary circuit is equipped with a large set of online instruments to measure all necessary chemistry parameters.
- The plant is enhancing severe accident management capabilities by implementing additional hardware provisions beyond the scope of existing equipment required by the Westinghouse Owners Group approach.

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

- The operating organization should develop and implement a program for replacement of all obsolete plant equipment, and at the same time continue to expedite and enhance the efforts to strengthen the spare parts supply chain.
- The plant should consider implementing a suitable arrangement for the physical securing of isolation devices.
- The plant should assess and minimize the cumulative safety significance of temporary modifications and minimise their number and limit their duration.
- The plant should enhance the process of event investigation and analysis to ensure an in-depth analysis of events.
- The plant should reassess the current practice of operating within the controlled area including management/treatment of personal contamination and contaminated equipment to ensure the effectiveness of measures to avoid contamination in normal and emergency situations.
- The plant should improve the current chemical control programme for the emergency diesel generators and the other emergency systems.
- The plant should develop a comprehensive plan for implementation of the SAMGs covering also future hardware upgrading with a focus on realistic timing of actions

and the optimum use of resources.

Angra 1 NPP management expressed a determination to address the areas identified for improvement and indicated a willingness to invite a follow up visit in about eighteen months.