

EXECUTIVE SUMMARY

This report describes the results of the OSART mission conducted for Almaraz Nuclear Power Station in Spain from 5th to 22nd February 2018.

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 twelve 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; Human – Technology – Organization Interaction (HTO); and Long Term Operation (LTO).

The mission was coordinated by an IAEA Team Leader and Deputy Team Leader and the team was composed of experts from Bulgaria, Brazil, France, Germany, Mexico, United Arab Emirates, the United Kingdom and the United States of America as well as staff from the IAEA. The collective nuclear power experience of the team was approximately 406 years.

The team identified 9 issues resulting in 3 recommendations and 6 suggestions. 9 good practices were also identified.

The following areas of good performance were noted in particular:

- The use of a film-forming amine compound to significantly reduce the transport of corrosion products to the steam generators.
- The use of a cross-functional indicator to show the cumulative effect of equipment status and planned activities on the status of daily operational focus.
- The installation of a centralized vacuum system for cleaning, decontaminating and discharging liquid waste to the plant's disposal system.

The most significant proposals for improvement were:

- The plant should implement further actions related to management, staff and contractors to enforce the standards and expectations related to industrial safety.
- Plant should take measures to reinforce and implement reactivity transient response standards that will enhance performing reactivity manipulations in a deliberate and carefully controlled manner.
- The plant should improve the support, training and documented guidance for the Severe Accident Management Guidelines (SAMG) users in order to mitigate some complex severe accident scenarios.

Almaraz NPP 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 Spain, an IAEA Operational Safety Review Team (OSART) of international experts visited the Almaraz Nuclear Power Plant from 5th January to 22nd February 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; Human – Technology – Organization Interaction; and Long Term Operation. 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 Almaraz NPP is located near the town of Almaraz in the south-west of Spain, in the province of Caceres, approximately 200 km from Madrid. The site occupies 1683 hectares in a largely rural setting and is adjacent to a man-made lake, retained by a dam, which provides cooling water. The lake features a segregated volume of water as the ultimate heat sink for safety related systems. The plant comprises two pressurised water reactors, each with three primary coolant loops and supplying steam to a single turbine generator. Each of the two units is rated at approximately 2950 MW thermal resulting in gross electrical output of approximately 1045 MW. Construction started in 1973; Unit 1 started commercial operation in 1983 and Unit 2 in 1984.

The plant is owned jointly by Iberdrola (53%), Endesa (36%) and Gas Natural Fenosa (11%).and these organizations have created a management structure that operates the Almaraz and Trillo NPPs. The corporate Headquarters is located in Madrid. The corporate organization deals with issues related to corporate planning and finance; human resources; supply chain, security, information systems; regulatory affairs; nuclear oversight; and technical services including nuclear fuel, safety and licensing. The Almaraz Plant Manager has line responsibility for plant operations and maintenance, technical support, radiation and environmental protection issues.

The Almaraz OSART mission was the 200th in the programme, which began in 1982. The team was composed of experts from Brazil, Bulgaria, France, Germany, Mexico, Russian Federation, Sweden, UAE, UK, United States of America and the IAEA staff members. The collective nuclear power experience of the team was approximately 406 years

Before visiting the plant, the team studied information provided by the IAEA and the Almaraz 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 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 and all the staff of Almaraz NPS are strongly committed to continuous improvement of the operational safety and reliability of their plant.

The team saw notable achievements made by Almaraz in recent years, such as implementing a comprehensive management system, as well as significant equipment renewal plans, that has contributed to reinforcing safety as the overriding priority at the plant.

To this end the plant has recognized the need to proactively manage demographic issues within the workforce and sustain safe reliable operations over the long term. The team noted several examples of extended hand over between new and experienced personnel and additional staff in post during the transition period.

In addition the plant has changed out many major components to minimize the potential for longer term safety and reliability issues, for example steam generators, reactor pressure vessel head and instrumentation & control systems.

It was also noted that the plant has developed a range of tools to enhance their capability to continuously improve equipment and personnel performance.

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

- The use of a film-forming amine compound to significantly reduce transport of corrosion products to the steam generators.
- The use of a cross-functional indicator to show the cumulative effect of equipment status and planned activities on the status of daily operational focus.
- The installation of a centralized vacuum system for cleaning, decontaminating and discharging liquid waste to the plant's disposal system.

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

- The plant should implement further actions related to management, staff and contractors to enforce the standards and expectations related to industrial safety.
- Plant should take measures to reinforce and implement reactivity transient response standards to enhance performing reactivity manipulations in a deliberate and carefully controlled manner.
- The plant should improve the support, training and documented guidance for the Severe Accident Management Guidelines (SAMG) users in order to mitigate complex severe accident scenarios.

Almaraz 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.