

SUPPORT SERVICES FOR ANGRA 1 NPP IN BRAZIL

A. SEISDEDOS

In May 1997, the Spanish utility IBERDROLA became the awardee, through IBERDROLA Ingeniería y Consultoría, of a contract for providing operating, supply management and refueling technical support engineering services for Unit 1 of the Angra Nuclear Power Plant, which had been put out to international tender by FURNAS CENTRAIS ELÉTRICAS

Later, at the decision of the Brazilian government, Furnas' nuclear assets were separated and transferred to another State-owned company called ELETRONUCLEAR, which will be in charge of undertaking all operations related to the Brazilian nuclear sector.

The Almirante Alvaro Alberto Nuclear Power Plant is located on Itaorma beach in the municipality of Angra dos Reis and relatively near the country's two main socioeconomic centers, at a distance of 130 Km from Rio de Janeiro, 220 Km from São Paulo and 350 Km from Belo Horizonte.

Construction of the first unit, Angra 1, began in 1972. This unit has a capacity of 657 MW, while Angra 2 and 3 will have a capacity of 1300 MW each. These three units are pressurized water reactors (PWR), with two loops in Angra 1 and 4 loops in the other two units. Units 2 and 3 are in the startup phase and under construction, respectively.

The main features of the Angra 1 nuclear power plant are as follows:

Reactor: Pressurized water with two loops
Number of fuel

assemblies: 121

Total thermal power: 1882 MWt

Turbine:

Steam conditions: 860 psig at 528°F

Speed: 1800 rpm.

Generator:

Type AC, 3-phase, hydrogen cooled

Power factor: 0.9

Power: 760 MVA

Frequency: 60 Hz.

Traditionally, FURNAS had a contract with an international firm to manage certain services to be provided during refuelings, which were subcontracted to American and European companies specializing in these services, as well as to permanently manage certain services involving material and spare part procurements on international markets.

In the tenders requested by FURNAS, in which

IBERDROLA was the successful bidder, a new concept was introduced in that the awardee (IBERDROLA) will assume responsibility for the services it provides and will not be a mere intermediary between FURNAS and the service contractors. In addition, the concept of continuity is established, which means that this 5-year contract will allow for ongoing improvement from one refueling to the next by making use of lessons learned in each refueling and taking advantage of support and experience exchanges between electrical utilities.

The contract, which was signed in Furnas' offices on June 10, 1997, includes the following groups of services:

1. *Purchasing Management.* The purpose of this job is to act as purchasing agent for



General view of ANGRA Npp



Contract Signature. In the upper photograph from left to right: Mr. Cerezo, Mrs. Sánchez-Mayoral, Mr. Carvahal, Mr. Seisdedos, Mr. Pérez Alonso, Mr. Laercio, Mr. Pineco, Mr. Figueirido, Mr. Monteiro and Mr. Porto

ELETRONUCLEAR for procuring all materials and parts for the nuclear power plant that are not available on the Brazilian market. These parts and materials are basically of American origin, although they can also be found on European markets.

To perform these purchase management tasks, ERGYTECH INC., an IBERDROLA group company through the Spanish firm AMARA, S.A., will take part. Ergytech is an American company headquartered in Houston whose corporate purpose is the export of equipment and spare parts for thermal and nuclear power plants.

2. *Engineering and Consulting Services.* This group of services is for providing support to ELETRONUCLEAR to the extent that it requires engineering and consulting services such as design modifications, studies required by the Brazilian regulatory authority, etc.

3. *Refueling Floor Services.* This section includes all those services required during refueling and that Angra cannot perform on its own, in most cases because it is not worthwhile to own the equipment required for inspections and other services. For this group of activities, IBERDROLA will count on the collaboration of staff from Almaraz NPP, a Westinghouse PWR the same as Angra 1, and the Spanish Inspection and Training services firm TECNATOM. When deemed necessary, certain services will be subcontracted to other Spanish firms, as well as to American and European firms depending on needs.

Execution of these services for the Angra Nuclear Power Plant is being managed through a company that IBERDROLA has opened in Brazil, in the city of Rio de Janeiro, called IBERDROLA Consultoria e Serviços do Brasil. During the months of July and August, 1997, all preparations for providing the constituent services for outage P-7 were made. The services managed and provided by



IBERDROLA personnel and contracted by IBERDROLA are as follows:

- Refueling Services. Opening and closing the reactor vessel and loading the fuel.
- Steam Generator eddy-current testing and tube plugging.
- Steam Generator tube sheet sludge lancing.
- Support for health physics activities during plant outage.
- Steam Generator large bore snubbers maintenance.
- Steam Generator stabilizers.
- Consulting for motor operated valve design basis review and diagnostic testing.
- Visual inspection of fuel assemblies.
- Main steam isolation valve maintenance.
- Reactivity control system.

The people involved in the different services traveled to the Angra plant during the months of September and October. At peak moments, there have been more than 50



IBERDROLA staff and IBERDROLA-contracted workers working at the plant.

In addition, both IBERDROLA and TECNATOM sent a refueling coordinator to Angra for the entire refueling to provide the necessary support to the plant throughout all of P-7. Our personnel have not only carried out the tasks commissioned by Angra, but they have also provided support for all kinds of problems that have arisen, such as operational and procedural problems, suggestions on possible improvements, etc.

As a utility, IBERDROLA is firmly committed to supporting Angra in a utility-to-utility relationship, in an attempt to optimize processes and also to exchange experiences. This will all be of benefit to the nuclear sector, in which IBERDROLA has obtained some of the best capacity factors in the world in all the nuclear power plants in which it has invested. In addition to outage P-7 and within the area of purchasing management, more than 200 purchase requests have been systematically processed in the last 6 months, and some of Eletronuclear's orders are now being received. In the Engineering and Consulting Area, we are also beginning to receive some of the requests for studies and experience exchanges on how things are done in other countries.



Alberto SEISDEDOS F. DEL PINO is Commercial Director of Iberdrola Ingeniería y Consultoría and Director of Iberdrola Consultoria e Serviços do Brasil. With a degree in Physical Science from the Universidad Complutense of Madrid (1973) and PDD of the IESE (1992), he began his professional career in Empresarios Agrupados working on the Almaraz, Cofrentes and Trillo nuclear power plant projects and several thermal plant projects in the area of Instrumentation and Control; he was assistant director of the department as of 1987. In 1991, he joined UITESA (Iberdrola Group) as Director of Corporate Development, and later became UITESA's Operations Director from 1993 to 1995, at which time he joined Iberdrola Ingeniería y Consultoría as Thermal Project Director. In 1996, he became involved in international projects in Mercosur within the Project Promotion Division.