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Almaraz NPP (UI-UII)

OWNERS:

Iberdrola Generación Nuclear (53%), Endesa Generación (36%) and Gas Natural Fenosa (11%) LOCALIZATION: Almaraz (Cáceres) **TECHNICAL SPECIFICATION:** Reactor Type: Pressurised Water Reactor (PWR) Supplier: Westinghouse Thermal Power: 2,947 MWt (U-I) - 2,947 MWt (U-II) Fuel: Enriched Uranium Dioxide (UO2) N° of Fuel Elements: 157 Gross Electrical Power: 1,049.43 MWe (U-I) - 1,044.45 MWe (U-II) Net Electrical Power: 1,011.30 MWe (U-I) - 1,005.83 MWe (U-II) Cooling: Open Ciucuit. Arrocampo Reservoir Start of Commercial Operations: May 1981 (U-I) - October 1983 (U-II) **Existing Production Date Authorisation:** 08/06/2010 for a period of 10 years Cycle Duration: 18 months both units



Trillo NPP

OWNERS: Iberdrola Generación Nuclear (48%), Gas Natural SDG (34,5%), Iberenergía (15,5%) and Nuclenor (2%) LOCALIZATION: Trillo (Guadalajara) **TECHNICAL SPECIFICATION:** Reactor Type: Pressurised Water Reactor (PWR) Supplier: KWU Thermal Power: 3,010 MWt Fuel: Enriched Uranium Dioxide (UO2) N° of Fuel Elements: 177 Gross Electrical Power: 1,066 MWe Net Electrical Power: 1,003 MWe Cooling: Natural Draft Towers (Río Tajo) Start of Commercial Operations: August 1988 **Existing Production Date Authorisation:** 17/11/2014 for a period of 10 years Cycle Duration: 12 months

CNAT PROFILE

BUSINESS OWNERS

The owner companies of Almaraz and Trillo Nuclear Power Plants formed an Economic Interest Grouping in November 1999, called Centrales Nucleares Almaraz-Trillo, A.I.E., for the integrated operation, management and administration of both plants, and their shares in the assets of each remained unchanged. Accordingly, the shares of the owner companies in the installed capacity at both plants, is as follows:





MISSION, VISION, VALUES, POLICIES

The mission of Almaraz-Trillo Nuclear Power Plants is to produce electricity in a manner which is safe, economic, respectful to the environment and guaranteeing long-term production by optimum operation of the Almaraz and Trillo plants. Our vision is to position the Almaraz and Trillo nuclear power plants amongst the best in terms of safety, quality and costs.

The mission and vision is complemented by a set of shared values that must at all times guide the way people act in the organisation and how they can contribute to achieving the mission. These values are the cornerstone of social responsibility at CNAT and are based on ethical principles, respect for people, professionalism and attention to safety and the environment.



Different corporate policies are adopted aimed at fulfilling the mission, and they determine the work patterns throughout the whole organisation so that it can be achieved in a socially responsible manner. www.cnat.es



SUMMARY OF THE YEAR

A particularly important milestone in 2014, was renewal of the operating license of Trillo I, for a period of ten years from 17 November 2014, which the Ministry of Industry and Tourism - after a favourable report from the Nuclear Safety Council (NSC) - granted the Economic Interest Grouping Almaraz-Trillo Nuclear Power Plants (CNAT) as owner of the facility.

The excellent performance and the high level of availability of Almaraz and Trillo have been outstanding features of their operation during 2014, a year in which the joint production of both plants reached 24.103 million kilowatt hours, representing 42.1% of the electricity produced by Spanish nuclear power plants and 9% of the total net generation of the national electricity system.

Also noteworthy are the results obtained in the risk prevention, and the Almaraz plant was refuelled with zero accidents, thanks to the actions taken and the various measures implemented. Also, CNAT's environmental commitment was revalidated by AENOR in December 2014, after the environmental management system certification for the installations was renewed for three additional years, in accordance with the international standard UNE-EN-ISO-14001.

The good results achieved are the fruits of a programme of ongoing technological upgrading, which has safety as the main cornerstone of plant operations, alongside the fulfilment of commitments made to the regulatory body as part of the stress tests conducted in the European Union, and the direction taken by the organisation as set out in the 2014 Action Plan. This has resulted in a significant degree of progress and a positive overall rating since its launch in January, and has become the focus of CNAT planning activities.













ACTIVITY REPORT

OPERATIONS

Almaraz Plant

Refuelling has taken place at the two units during the year. On 25 January the twenty-first refuelling outage at Unit II took place, and between 23 June and 20 August the twenty-third refuelling outage at Unit I, and the work programme was successfully completed in 58 days resulting in zero accidents.

Besides the refuelling outages, there was a proactive but unscheduled outage at Unit II on 29 January, to replace the exciter and at Unit I, there was an automatic reactor shutdown on 17 September due to activation of the reactor protection system for low pressure in the pressurizer.

The gross output generated by the two Units at Almaraz Nuclear Power Plant was 15,795 million kWh, and the net joint production was 15,201 million kWh. Individually, gross electricity production by Unit I was 7,510.8 million kWh, and 8,284.5 million kWh by Unit II.

Gross electricity production accumulated at Almaraz since 1 May 1981 was 462,881,9 million kWh (233,513,3 by UI and 229,368,6 by UII).







Trillo Plant

During 2014 Trillo Nuclear Power Plant achieved a successful annual operating balance, recording 8,308 GWh gross electricity and 7,785 GWh net electricity. There have been no automatic reactor shutdowns for 7 consecutive years. The twenty-sixth refuelling outage took 36 days from 23 May to 28 June.

The most notable event of the year was the renewal of the operating permit, valid for ten years from 17 November 2014, which the Ministry of Industry and Tourism granted to the Centrales Nucleares Almaraz-Trillo (CNAT) Economic Interest Grouping (Agrupación de Interés Económico).

Trillo Nuclear Power Plant has an accumulated gross electricity production from 14 May 1988 to 31 December 2014, of 213,478,000 kWh.

There were 28 containers with a total of 588 fuel elements in Individual Temporary Storage (ITS) on 31 December 2014.









Almaraz Plant

The twenty-third refuelling and general maintenance of Unit II took place during the second-half of 2014, from 23 June to 20 August. The general programme was executed as planned in 58 days and resulted in zero accidents.

During this period, more than 1,400 people in addition to the core workforce were recruited to the Plant to assist in the execution of about 9,000 refuelling activities, including the replacement of 64 fuel elements, performing preventive maintenance tasks and implementing various design modifications, notably those associated with implementation projects for the Alternative Shutdown Panel - ASP, increasing the seismic margin of equipment, adopting to the new fire protection rules (NFPA) and other Fukushimarelated improvements, such as implementing an electric generator and instrumentation for events beyond the design bases.

These design modifications were implemented before the twenty-first refuelling and general maintenance of Unit II which took place between 23 November 2013 and 25 January 2014. The collaboration of over 70 specialised service companies employing about 1,200 individuals were involved, in addition to the usual core workforce during these 63 days



Trillo Plant

The twenty-sixth refuelling and general maintenance outage took place between 23 May and 28 June 2014. The activity schedule was completed in 36 days and involved the services of over forty specialist firms which hired a thousand workers additional to the usual core workforce.

Notable activities carried out in addition to the replenishment of fuel, included inspection of the seals of the three main pumps of the primary pressurised water circuit, and inspection of the lower and axial bearings of the three main pumps; reviewing components of low pressure casing no. 2 of the turbine and changing the vane crown; inspection of redundancies; inspection of Loop no. 10 of the secondary steam circuit; inspection and cleaning of the steam generators, and various design modifications resulting from analysis of the stress tests.



RADIOLOGICAL SAFETY AND PROTECTION

During 2014 the installations operated completely normally, without producing any significant incident that affected nuclear safety or radiological protection, employees, or the plant environment.

The results obtained from the measurements show that the dose rate of professionally exposed personnel was again far below the legal limits established. In the case of Almaraz, the collective dose of staff totalled 554.82 mSv per person for the combination of the two units, and at the Trillo Plant, the dose totalled 297 mSv per person.



TECHNOLOGICAL UPDATING

As has become the case in recent years, CNAT has continued to make a significant effort aimed at improving the safety of its facilities as well as technologically upgrading components and systems to improve their reliability.

At the Almaraz Nuclear Power Plant, and as a result of the operating permit awarded to Unit I for a new alternative shutdown panel (it was implemented in 2013 at UII), improvements in-hand also include a new room on the roof of the fuel building for installation of the new redundant filtration unit, fire protection improvements arising from compliance with NFPA 805, and improvements to cabinets and electrical conduits for adaptation to RG 1.75.

As part of the technological renewal plan the new safety class units have been allocated for cooling





the Control Room and the 6.3 kV breaker rooms, and the design, manufacture and factory testing of the new Digital control system for auxiliary feedwater turbo has been completed and will be deployed at the next refuelling.

In the Trillo Nuclear Power Plant, and as part of the instrumentation and control equipment renewal plans, there are plans to implement the new turbine control and protection system during the next refuelling in May 2015. Preparation for the design of the new neumobolas system was started in 2014, as well as new vessel level probes, and these projects will be implemented in 2016 and 2017.

As a result of analyses following the Fukushima accident, both the Almaraz and Trillo Nuclear Power Plants, have been equipped with portable equipment and connections with the plant necessary to implement mitigation strategies for accidents beyond the design bases. In addition, construction is underway at both plants for a new seismic building as an alternative emergency management centre, and deployment in 2015 of a new wireless communications and lighting system for better performance in emergencies. Finally the new containment filtered venting system is being developed for both Plants, and this will be located in a new seismic building close to the Containment building, where new catalytic hydrogen recombiners are being installed at Almaraz NPP (2016). Trillo NPP already has this equipment.



Quality is intrinsic to all activities at CNAT and is the main source of confidence for our owners, the social environment, employees and business partners. The commitment to quality at CNAT has been recognised by the Spanish Association for Standardisation and Certification (Asociación Española de Normalización y Certificación - AENOR) by the award since 1995, of an official certificate attesting compliance of our Quality Management System with the UNE EN ISO 9001 standard for nuclear originated power since 1995. In 2014, AENOR conducted a successful follow-up audit to maintain certification of our Quality System.

We also voluntarily submit to international assessments to determine the degree of organisational excellence. These include WANO Peer Reviews, which in December 2014 took place at Almaraz NPP with a satisfactory overall result; and WANO Technical Support Missions, to evaluate specific aspects with reference to best practices in the industry, and in 2014 they covered Trend Analyses and Self-Assessments.

Continuous Improvement is part of CNAT's organisational culture and it is for this reason that we manage around 7,000 corrective and improvement

actions, revisions and studies each year, based on internal and independent evaluation (Quality Assurance audits and inspections), and the units themselves conduct activity and process self-assessments. Furthermore, trend analyses of low level incidents are carried out to enable preventive actions to avoid the most significant incidents.











ENVIRONMENT

ENVIRONMENTAL QUALITY MANAGEMENT

The commitment to respect the Environment by A.I.E. Almaraz-Trillo Nuclear Plants is reflected in the organisation's Environmental Policy.

The Environmental Policy drives the application of the Environmental Management System and its continuous improvement, reflecting the Board's commitment and constituting the founding principles on which the annual objectives programme is based, and in more general terms, the company's activities in relation to the Environment.

Environmental Policy

The mission of ALMARAZ-TRILLO NUCLEAR POWER PLANTS is to produce electricity in a manner which is safe, reliable, economic, respectful of the environment, and which guarantees production over the long term, by optimum operation of the Almaraz and Trillo nuclear power plants, and an Environmental Policy has been defined appropriate to its nature, magnitude and environmental impact, which serves as a reference to establish and review objectives and environmental aims, and based on this, it commits to:

- **Guarantee** compliance with the environmental legislation in force and any other voluntarily accepted requirements, maintaining an attitude of ongoing adherence.
- **Operate** the installations with respect for the environment, identifying, preventing, controlling and minimising, as far as possible, the environmental impact of its activities.
- **Continually** making improvements to all processes which could have environmental repercussions.

- **Controlling** and reducing leakages as far as reasonably possible, and conventional and nuclear waste.
- **Motivating** and training staff in respect to the environment, stimulating development of an environmental culture and communicating the Environmental Policy within and external to the Organisation.
- **Introducing** and maintaining updated a Standard Environmental Management System.



Almaraz-Trillo Nuclear Plants continued to take major actions in relation to environmental issues during 2014, and these are incorporated in the Environmental Management Programme, the most significant of which are detailed below:

Engineering and assembly work has been performed to replace fluorinated gases which effect the ozone layer, as required by EU Regulation 2037/2000. Replacement of the equipment has been underway since 2009, and has involved a major change, with approximately 120 items of equipment involved between the two plants.

Throughout 2014 dispersion of effluent water to the Tagus River in the vicinity of Trillo NPP was improved, which involved cleaning the river banks near to the intake zone.



During 2013 and 2014, several actions were undertaken to replace paper documents by electronic distribution with the aim of reducing paper consumption in the organization. IT applications have been implemented to improve the monitoring of environmental issues at both plants: environmental monitoring of intakes and discharges, and monitoring of historical meteorological parameters.

ENVIRONMENTAL AUDITS

In September 2014, the Environmental Management System (ISO 14001) was audited by the Spanish Association for Standardisation and Certification (AENOR), after the Certificate had been in force for nine years, and it was declared to be "compliant".

The auditors inspected the Almaraz and Trillo plants and activities at the Central Offices. Previously, in May, an internal system audit had been carried out, which forms part of the verification process.

There were several inspections by the Nuclear Safety Council on subjects related to the environment at both plants.

ENVIRONMENTAL MONITORING PROGRAMMES

Almaraz and Trillo plants have historically implemented various environmental monitoring programmes, with the aim of verifying the absence of significant environmental impacts as a consequence of their activities, whether of a radiological or conventional type.

Study of aquatic ecosystems



Two environmental studies of the surrounding areas of the Almaraz plant were carried out covering the Arrocampo and Torrejón reservoirs: An Ecological study of the aquatic ecosystem and a Thermal study of reservoirs.

These surveillance studies are broadly based because the Arrocampo reservoir must also be regarded as another system forming part of the plant as it was constructed specifically for industrial cooling of the Almaraz Plant, and it is used for final heat dissipation which requires the most accurate knowledge possible about characteristics relating to its capability to fulfil the cooling function in both the short and the long-term. This requires intensive management and surveillance of both biological and physico-chemical parameters, especially temperature.

The environmental study of the aquatic ecosystems carried out in the vicinity of the Trillo plant



consist currently of monitoring the river Tajo, where the surplus thermal discharge is made after cooling in the towers, together with the general phisico-chemical condition of the Plant, as well as the Entrepeñas reservoir, located downstream in the proximity of the Plant. This study covers evaluation of the water quality from a physico-chemical viewpoint, and its content of metals and other undesirable substances, as well as the characteristics of other elements of the aquatic ecosystem such as sediments, benthic algae, phyto and zoo plankton and ichthyofauna.

Environmental radiological monitoring

Almaraz and Trillo Plants continuously and strictly control and monitor their own radioactive effluent emissions. Nonetheless, in order to verify experimentally the impact radioactive elements might have on the environment, the plants have implemented an Environmental Radiological Monitoring (ERMP) through Programme direct measurement of radiation levels in the surroundings near to the installations, and of the content of radioactive substances from a series of types of environmental samples which are collected from a set of sampling points.

Comprehensive monitoring is carried out on all abiotic elements and living organisms represented in the ecosystems associated with all the natural resources of the surroundings of the plants (air, land and water).

Over a thousand samples are taken at each otf the Plants and between 1,500 and 2,000 different types of analyses are carried out (gamma spectrometric, beta activity, environmental doses, strontium, tritium and radioiodine), clearly demonstrating the magnitude of the surveillance implemented. The usefulness of the results obtained from the analysis are assured through parallel implementation of a quality control programme by another laboratory, independent of the main one, and by the implementation of a programme of direct independent monitoring (PVRAIN) by the Nuclear Safety Council.

Also, in the case of the Almaraz Plant, a collaboration agreement is maintained with CEDEX to enable this official body, reporting to the Ministry of Public Works, to carry out independent surveillance of the aquatic resources in the proximity of the Plant. Extremadura Council also carries out independent radiological monitoring, with the help of the University of Extremadura.

The results obtained during 2014 at both plants indicate that the radiological state of the ecosystems in their surroundings have experienced no significant variations during the year, with natural background values remaining unchanged, confirming the absence of environmental effects due to the leakage of radioactive elements, rendering radiologically insignificant any leakages from both plants.

Meteorological studies

Almaraz and Trillo plants employ meteorological stations to continuously measure and record the most significant parameters such as temperature, precipitation, wind direction and speed, humidity and solar radiation. Meteorological information is of particular relevance for various applications related to the environment, and provides an excellent description of the climate at the site, after thirty years of monitoring.

The stations provide the required redundancy to ensure continuous availability of meteorological information.













SOCIAL

PEOPLE MANAGEMENT

CNAT brings together a team of 822 professionals characterised by their experience and high qualifications: 48% hold a university qualification.

During 2013 there were 21 new graduate recruits and all participated in an initial training programme and specific preparatory training before taking up their positions. These recruits facilitate staff turnover while ensuring the safe and reliable operation of the plants in the long-term.

The average age of staff at CNAT is 49, and they are mainly concentrated in Extremadura (51.2%), Castilla-La Mancha (39.1%) and Madrid (9.7%). Also the proportion of women in the different groups of the company is 8%, and the involvement of young graduates with broad qualifications is notable.

Also, it should be noted that CNAT's staff are continuously supported by personnel from external companies during normal operation of the plants, and especially during refuelling.



Prevention of work-place risks

CNAT has its own Prevention Service which is responsible for developing preventive actions, employing procedures and computer applications to ensure staff participate in risk prevention (communication of risks and suggestions for improvement using the requests manager on the Intranet, and the Actions and Evaluation System AES).

Some of the most significant activities in 2014 involved consolidation of the Prevention Service organisational structure (a single structure for the entire CNAT organization) and those activities detailed in the 2014 Action Plan related to the integration of prevention throughout the organisation: 4 risk prevention awareness campaigns aimed both at own employees and partner companies, risk analysis routine activities and practical training for graduates and members of the Steering Committee on the use and application of various items of personal protection equipment based on the risks in executing the work. The technical prevention units at both plants have managed approximately 1,400 preventive and corrective activities.



In addition, CNAT's Prevention Service maintains a Health Surveillance unit at each Plant, which oversees the health of workers in the three workplaces, and they use all the specific and required health monitoring protocols in their medical examinations, based on risk assessments conducted by Technical Prevention for each post.

Also, this unit provides health care, care for medical emergencies or accidents and maintains Level I accreditation for care of acute irradiated and contaminated casualties. In an effort to maintain the highest standards of quality regarding the health of our workers, activities introduced by Preventive Activity Planning for 2014 included a new health surveillance protocol for better control of exposure to chemical risk, and the biohazards exposure protocol was updated.

During 2014, Almaraz-Trillo Nuclear Power Plants continued efforts to reduce workplace accident rates, by combining training and information activities, risk assessment and accident awareness campaigns, and especially the systematisation of formal prejob briefings for any work significant in terms of risk prevention.

Due to the cooperation of all employees, the accident rates obtained in 2014 at both Trillo and Almaraz can be considered acceptable, with a low severity index, indicative of the low severity of accidents.

CNAT	Own staff	Contractor's staff	Own staff + Contractor's staff
General frequency index	3.75	2.87	3.13
Sick-leave frequency index	3.75	0.32	1.34
Severity index	0.116	0.004	0.038

ACCIDENT RATING YEAR 2014



Training

Almaraz-Trillo Nuclear Power Plants have permanent resources devoted to planning and developing annual training plans for each workplace, both for initial training and for retraining and training in management skills.

In 2014 **143,008.6 hours of training were** provided for **16,566 workers.**

The proportion of training programmes devoted to retraining workers was 61%, and the proportion corresponding to initial training was 39%.

During the year, 586 initial training and retraining courses were held, with the participation of

7,287 CNAT employees totalling 80,001.2 training hours. 97.6% of employees received some training, with an average training provision per employee of 79.7 hours, which represents a dedication of 4.8% of the working year. Regarding the group of women who are part of the CNAT team, 97% have participated in training activities during the year, receiving an average of 59 hours of training. Training programmes for future Plant operators, prior to joining the staff, have resulted in the provision of 16,089 hours of training during the year.



GENERAL BREAKDOWN OF PROGRAM 2014 (Hours)

During the year Almaraz-Trillo Nuclear Power Plants maintained the control process for monitoring the qualification of contracting company personnel, and they have continued to encourage improvements in their training, by providing support for training activities scheduled for their staff, and by arranging specific training sessions for these workers. 32,444.84 hours of initial training have been provided for 3,122 contractor employees. Regarding refresher training and retraining, support for contractor personnel has been provided for training activities planned for their own staff, specifically 6,157 external attendees received 30,562.5 hours of training by CNAT. Overall, **9,279 employees of contractors have received 63,007.3 hours of training**, which represents 44% of all the training undertaken throughout the whole of Almaraz-Trillo Nuclear Plants.

Internal communication

Internal communications is a strategic element for CNAT. Throughout the year several actions and initiatives have been launched as part of the Internal Communication Plan and the 2014 Action Plan. Also, the communication channels that the company uses with employees have been consolidated. These include the quarterly magazine "CNAT World", of which 3 have been published, and the monthly newsletter, "In five minutes".





RELATIONSHIP WITH SOCIETY

During 2014, the ongoing dialogue that CNAT conducts with the institutions in its surroundings has enabled the maintenance of fluid and dynamic relationships which have resulted in 4 biannual meetings, two at each Plant, with the mayors of the municipalities in the areas of influence, and details of operating results and future plans and projects were provided. 160 personalised meetings were also held with the mayors of the surrounding municipalities to study the relationships of the Plants with each municipality on a bilateral basis, and potential collaboration channels. Similarly, this year the heads of both plants have actively participated in the Local Information Committees convened by the Ministry of Industry, Energy and Tourism (MINETUR), providing the information required at all times.

Cooperation agreements between the news agencies and press associations most representative of the Plants' surroundings have been renewed, and they are used to promote the training and specialisation of Information Science final year students on nuclear sourced electricity production. A nuclear technology course for communications media professionals was held at the Trillo installation, which is run annually.



The divulgence of information by CNAT on nuclear energy and plant operations, is reflected in the 8,473 visitors received this year at the Information Centres, 4,113 at Almaraz and 4,360 at Trillo. Between the two centres a total of 992,529 visitors have attended the installations at Almaraz and Trillo since they began operating in 1977 and 1981 respectively.

The CNAT website also contributes to this communication task (www.cnat.es) and the corporate blog www.energiaymas.es, where information is provided related to the activity of the plants and their environments.

In addition, the commitment of the plants to their neighbouring communities is reflected in

collaborative arrangements that have been renewed during 2014 in the economic, social and environmental spheres, and in educational projects.

To ensure continuous improvement in the quality of products and associated services, CNAT ensures that its suppliers are aware of and participate in the work processes and protocols of the company.

Trading volume in 2014 was €361.5 M. 92.3% (765) of the total number of suppliers identified (829) with contract awards, corresponded to domestic suppliers.





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