VANDELLÓS-I DISMANTLING NEARING COMPLETION

J. R. ARMADA

Spain is witnessing the phase-out of a nuclear power plant. It is a unique experience in our country and therefore the dismantling work has been watched closely, not only from here but also from abroad. The Empresa Nacional de Residuos Radiactivos (ENRESA) is in charge of managing the dismantling and decommissioning work of the Vandellós-1 nuclear power plant, located in the municipality of l'Hospitalet de l'Infant (Tarragona). The work began five years ago and has been executed on schedule. The appearance of what was one of the first Spanish commercial nuclear power plants has been changed radically to leave premises suitable for any other activity.

Signature of the Vandellós-I nuclear power plant transfer from Hifrensa to Enresa and approval of the job license by the Vandellós-L'Hospitalet de l'Infant plenum culminated the steps that were needed for Enresa to begin the dismantling work at this nuclear power plant. In some five years, the appearance of this natural uranium-graphite-gas plant has changed radically, as Enresa will have cleared most of the current site when this job execution phase has concluded. Only the reactor shroud will be left standing, though with modifications to the building that houses it, for three decades, at which time complete dismantling of the grounds will be able to begin with full safety assurances.

THE ADMINISTRATIVE PROCESS

As of 1990, the plant owner, Hispano Francesa de Energía Nuclear (Hifrensa), took charge of conditioning the site and sending the spent fuel (high-level waste) generated in the plant to France for reprocessing; it treated the low- and intermediate-level waste produced during plant operation, part of which was sent to the low- and intermediate-level waste storage center in El Cabril. At that time, the MINER commissioned Enresa to draw up a Dismantling and Decommissioning Plan for Vandellós-I, specifying that it would become the operator responsible for the plant once the plan was approved by MINER.

The alternative proposed by Enresa for dismantling the plant was approved on November 27, 1992 by the General Directorate of Energy, after the Consejo de Seguridad Nuclear (CSN) issued a favorable report. On May 25, 1994, Enresa submitted the Vandellós-I Plant Dismantling Plan for approval to the Provincial Branch of the Ministry of Industry and Energy in Tarragona.

Following ordinary procedures, Enresa submitted the Environmental Impact Study required to begin the

work to the Ministry of the Environment on September 5, 1996. After a period of administrative formalities, the Ministry of the Environment issued a favorable Declaration of Environmental Impact for the plant Dismantling and Decommissioning Plan on October 14, 1997, and referred the dossier to the Ministry of Industry. On April 30, 1997, the CSN issued its report approving the Dismantling and Decommissioning Plan submitted by Enresa.

Finally, Hifrensa and Enresa submitted a document to the Ministry of Industry on October 23, 1997, requesting authorization for transfer of the responsibility as owner of the Vandellós-I plant to Enresa in order to execute the Dismantling and Decommissioning Plan once it was approved.

The final permit from the Ministry of Industry, signed on January 28, 1998 in the form of a ministerial order, authorized Enresa to assume ownership of the Vandellós-I nuclear power plant in order to proceed with dismantling. This transfer was endorsed with the signature before notary of the plant transfer agreement by the former owner, Hifrensa, to Enresa, the new owner responsible for the plant for the duration of the dismantling work.

WHAT DISMANTLING HAS INVOLVED

The Vandellós-I Dismantling and Decommissioning Plan stipulated that, once the spent fuel was removed and the radioactive waste generated during the plant's active life was processed (activities already completed by Hifrensa), almost all the structures and components outside the reactor shroud would be dismantled in a period of five years. This is the so-called level 2, according to the terminology coined by the International Atomic Energy Agency (IAEA).

Several activities were carried out during the first six months, primarily involving the commissioning of systems and installations, some of them newly designed (power supply and distribution) and in other cases modifications to existing systems (ventilation, effluent treatment, etc.). During this period, some conventional elements that could have interfered with subsequent work were also dismounted.

Once the preparatory activities were finished, Enresa dismounted the plant components and structures, differentiating between operations with conventional elements (uncontaminated) and dismantling of active parts (operations to dismount, segregate and move elements located in zones with radiological implications). In all, some 296,000 tons have been involved, of which 200 were low- and intermediate-level radioactive wastes that have been processed and transferred to El Cabril, where they will take up only 4% of the Cordovan storage center's capacity. The rest includes 16,500 tons of recycled scrap, rubble and concrete that have been used to fill in and level the terrain, as well as a relatively small quantity of oils and other products that have been transferred to authorized centers. The graphite from the fuel assembly sleeves (1,100 tons) has been stored in some conditioned areas under the reactor, and this will be managed in dismantling level 3 along with the 11,140 tons of radioactive material existing inside the reactor shroud.

The reactor shroud has been insulated and all its penetrations have been sealed. Only the instrumentation

required to monitor the variables that assure proper upkeep of the internal structures and shroud containment has been installed. Enresa has built a new building to house the shroud that is substantially smaller than the current one, and it has prepared the site for the so-called latency period.

THIRTY YEARS OF WAITING

Decommissioning level 3 of the Vandellós-I nuclear power plant will begin, according to Enresa's plan, in 2033. Why wait for three decades? This is because radioactive materials gradually decrease in activity over time due to the phenomenon of decay, and during this time they enter a state of lethargy that will permit the radiation inside the reactor to fall below certain levels that will facilitate total dismantling (decommissioning level 3) at the lowest radiological and economic cost and without the risk of incidents.

SAFETY AND CONCERN FOR THE ENVIRONMENT

Obviously, the Vandellós-I Dismantling and Decommissioning Plan includes safety measures in keeping with the project scope. All the activities that have been carried out have been rigorously studied and have been controlled by a Risk Prevention Plan and a Radiological Protection Manual designed exclusively for this job. Their objective is clear: minimize the risks, whether they be conventional or radiological. Studies such as the Environmental Impact Study or the Accident Analysis demonstrate that the implications outside the boundaries of the site are insignificant. Enresa also has a stake in environmental conservation and, therefore, the plan included an environmental impact study that, though it was not required for this type of project, was done to ensure that all its objectives were achieved. In addition, an Environmental Monitoring Plan and an Environmental Radiological Monitoring Plan were implemented.

Enresa has also wanted to be completely open about information on the activities that have been carried out, and therefore it has reported to the two commissions that were set up for this purpose. The Ministerial Order of January 1998 stipulates, among other things, that an Information Committee for the dismantling be set up, chaired by a representative of MINER and formed by members from the Ministry of the Environment, Consejo de Seguridad Nuclear, the federal government's delegation in Catalonia, the Generalitat de Cataluña, the Vandellós-l'Hospitalet de l'Infant City Council and the plant owner. On the other hand, a dismantling work Tracking Committee was set up, chaired by the mayor of Vandellós-l'Hospitalet and formed by the mayors of the neighboring municipalities, economic and social organizations, independent experts and representatives of Enresa.

OUTSIDE COLLABORATION

To perform the work, Enresa counted on the collaboration of UTE-VAN, a joint venture formed by Hifrensa and the engineering firms Initec and Inypsa. This contract allowed 110 workers from Hifrensa to take part in the dismantling work. On the other hand, the dismantling work for the main installations was contracted out to companies from the industry, both from the plant zone and from around the country. The unique experience gained in the dismantling is clearly a business opportunity for the companies that have participated, as the Vandellós-I project has become a reference point for international firms that will have to take on similar processes in the years to come. The dismantling has also been an important reference point for research and development of dismantling-related techniques.

With completion of the dismantling work, Enresa has reached one of the main milestones on a journey that began twelve years ago. As evidenced by previous projects managed by this company – decommissioning of the Andújar Uranium Factory (FUA) and startup of the El Cabril storage center – Enresa is technically prepared to undertake future dismantlings of nuclear facilities.

Juan Ramón ARMADA is an industrial engineer with a degree from the Polytechnic University of Madrid and has a degree in psychology from Madrid's Universidad Complutense. His first jobs were in the mechanical manufacturing industry; he later switched to the field of engineering in INYTEC. In 1988, he joined the Empresa Nacional de Residuos Radiactivos (ENRESA) as head of the Communication Infrastructure and Supports Department, and since 1997 he has served as director of ENRESA's dismantling division and has been in charge of the Vandellós-I dismantling project.