

**PRESS KIT  
SUCCESSFUL DECOMMISSIONING**



**NIRAS/ONDRAF  
BELGOPROCESS**

**Belgoprocess and NIRAS  
successfully decommission  
a nuclear plant**

Belgoprocess NV  
Dessel, Belgium  
20 June 2008

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## 1 BELGOPROCESS AND NIRAS SUCCESSFULLY DECOMMISSION A NUCLEAR PLANT

Belgoprocess NV processes radioactive waste and dismantles obsolete nuclear facilities. NIRAS, the Belgian agency for radioactive waste and enriched fissile materials, is responsible for the management of radioactive waste in Belgium. June 20 marks the official start of the demolition of Eurochemic, the former reprocessing plant. This means that Belgoprocess, after successful dismantling and decontamination, will be ready to proceed with the actual demolition of this nuclear plant. All of these activities fit in with the decommissioning project assigned to NIRAS by the Belgian federal government, i.e. dismantling of non-active nuclear assets, in the public interest. Key nuclear assets that were defined are: Eurochemic, the former reprocessing plant; SCK's former waste department and BR3.

## 2 CONTEXT

NIRAS, the Belgian agency for radioactive waste and enriched fissile materials, was established in 1980 to develop and implement a policy for the coordinated, efficient and safe, short and long-term management of all radioactive waste on Belgian soil. As a public institution, NIRAS is careful to develop and implement its policy for radioactive waste management such that it best serves the public interest. It is therefore not surprising that the Belgian federal government has also entrusted NIRAS with dismantling certain existing nuclear facilities from the past, the so-called 'non-active nuclear assets'. These decommissioning and decontamination activities can in a certain sense be seen in the framework of a 'major cleanup' for which development of new techniques and, in certain cases, construction of new installations were required. Of course, these activities offer an opportunity for Belgium to gain fundamental knowledge and know-how.

In 1986, the federal government ordered NIRAS to acquire all shares in Belgoprocess. This company had been established two years earlier to possibly re-open the Eurochemic facilities. Eurochemic was a collective undertaking by 13 OECD member states who operated an experimental reprocessing plant in Dessel from 1966 to 1974. In the meantime, this project had been disbanded and the Eurochemic site and installations had become property of the Belgian federal government. NIRAS was charged with the management of the installations, the waste produced by Eurochemic and the dismantling of any obsolete installations. Belgoprocess was called in and the Eurochemic site became Belgoprocess Site 1, also called BP1. In 1986, NIRAS was also entrusted with the execution of the decontamination programme for the Eurochemic Site (BP1) and the dismantling programme of the trial installation, which had been decommissioned since 1974. Early 1989, it was further charged with the management and dismantling of the earlier waste department of SCK.CEN (Site BP2). Two years later, in 1991, it also took on the management of the non-active nuclear assets of SCK.CEN. These consisted mostly of radioactive waste and fissile material produced by the test reactors.

Today, decommissioning of these non-active nuclear assets has reached its final stage. With respect to Eurochemic, dismantling works have been successfully completed and today, we are on the verge of starting the actual demolition.

## 3 HISTORY OF EUROCHEMIC

Construction of Eurochemic was started 50 years ago as an international cooperation project between 13 European member states (Germany, France, Belgium, Italy, Sweden, the Netherlands, Switzerland, Denmark, Austria, Norway, Turkey, Portugal, and Spain). It was a unique project in many respects. Eurochemic was the only company conducting both research and industrial production in the field of reprocessing. Reprocessing means to

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regain still usable fissile material from spent nuclear fuel. Eurochemic was built and started by pioneers from all over Europe. Internationally, Eurochemic guaranteed a definitive leap into the future in nuclear chemical research.

From 1960 to 1970, Eurochemic was “the place to be” for research in the field of reprocessing.

Today, 2008, Eurochemic (now Belgoprocess/NIRAS) will again make history through the executed dismantling activities and the planned demolition of the eastern compound.

Significant dates in the history of Eurochemic are:

- 1957 Establishment of Eurochemic
- 1960 Start of construction
- 1966 Start-up and operation
- 1974 Halt of activities (after France and Germany abandon the project)
- 1978 Takeover by the federal government with the aim of further reprocessing
- 1984 Establishment of Belgoprocess
- 1985 Belgoprocess takes over personnel
- 1986 Decision: no further reprocessing in Belgium; transfer of shares to NIRAS
- 1987 Start of decommissioning studies
- 1989 Start of dismantling pilot project
- 1990 Start of dismantling Eurochemic
- 2008 Start of actual demolition works

## 4 PILOT PROJECT

In preparation for the final, large-scale approach to the dismantling project, Belgoprocess started a pilot project from 1987 to 1990 to completely decontaminate and demolish two smaller storage facilities (6A/6B), which during the reprocessing phase had been used for filtration and storage of process fluids and applied solvents. The objectives of this pilot project were:

- to demonstrate feasibility of dismantling nuclear facilities
- to gain practical information regarding dismantling methods and techniques
- to test and/or develop dismantling equipment
- to train personnel in these new techniques and applications
- to evaluate the costs/benefits related to dismantling activities
- to confirm or reassess the results of the applied studies for dismantling the existing Eurochemic infrastructure

After demonstrating that no measurable radioactivity higher than natural background radiation remained in the left-over structures and in their construction materials, the pilot project was successfully completed in October 1989. Both buildings were removed from the controlled (nuclear) zone according to the General Regulation for the Protection of the Population and Employees Against Danger from Ionizing Radiation (Royal Decree dated February 28, 1963). The buildings were then demolished in the traditional way and natural landscaping was restored.

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### 5 DECOMMISSIONING OF EUROCHEMIC

In 1990, Belgoprocess started with the decommissioning of the reprocessing plant. The plant consisted of a rectangular, heavy concrete facility 300 ft. long, 90 ft. wide, and 90 ft. high. The plant had seven floors with 106 cell structures containing a total of approximately 1,500 tons of metal components in the form of equipment, in addition to approximately 12,500 m<sup>3</sup> concrete and 55,000 m<sup>2</sup> contaminated concrete surfaces.

### 6 APPLIED TECHNIQUES

The dismantling activities consist mainly of removing all metal process components (pipes, tanks, profiles,...) in order to decontaminate them for unconditional reuse (i.e. reuse without radiological restrictions regardless of intended use). Subsequently, all concrete surfaces of the cells (process spaces) were decontaminated. Upon completion of these activities, all surfaces were checked and rechecked (measurements and verification measurements) as part of the unconditional release of the remaining structures and components.

Specific equipment and techniques are applied for this purpose, such as hydraulic shears, plasma burners, scabblers and shavers, remote-controlled robots, elevated platforms, mobile floors, etc.

### 7 PROCESS FLOWS

Two significant waste materials produced during dismantling are metal and concrete. From 1988 to the end of 2007, a total of 1,494 tons of metal and 2,913 tons of concrete were decontaminated. In order to decontaminate metal, an abrasive spraying installation was developed for dry erosion of several microns of the metal surface in order to remove radioactive contamination. The concrete structures were shaved, subsequently ground to granules and tested (verification by sampling) before release.

### 8 SAFETY IS KEY

During dismantling of a nuclear reprocessing plant, mainly manual activities are performed by operators working with specific equipment, either automatic or not. Operators wear specially developed and adapted protective gear (for instance, full-face masks) for protection against possible radioactive contamination.

Belgoprocess's policy assigns top priority to safety of its workers. For instance from 1990-2007, average doses of less than 2 mSv/year per person were incurred while today the legal dose limit is set at 20 mSv/year. Additionally, no significant incidents or contaminations occurred. It should further be noted that special attention was paid to follow-ups of individual vibration loads. Procedures, work methods, education, continuous training and a safety-conscious approach to work emphasize the importance that Belgoprocess assigns to safety.

### 9 READY FOR DEMOLITION

Once process spaces have been completely cleared, have been decontaminated and released, those portions of the building are isolated and ready to be demolished in controlled fashion. Traditional demolition is executed by the specialized company De Meuter (Ternat).

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## 10 RESULTS

### 10.1 PRODUCTION FLOWS

Until the end of 2007, a total of 4,588 tons of waste material was produced by the dismantling activities at Eurochemic. 557 tons of this material were labelled as non-contaminated materials, 1,530 tons were marked as radioactive waste, and 2,356 tons (out of 2,501 tons) were decontaminated. The final conclusion is that at the end of the 1990-2007 period, 63% of all generated waste was recycled. The portion that was processed and conditioned as radioactive waste was stored awaiting later permanent disposal.

At the end of 2008, these results will be even more favourable because large quantities of concrete structures (9,552 tons) will be integrally recycled. In the end, 88% of all waste generated by the dismantling of Eurochemic will be recycled. Based on experience and the applied techniques, Belgoprocess is today convinced that upon completion of the dismantling of Eurochemic, more than 90% will have been recycled. Thus, in this field, Belgoprocess has become an example worldwide.

### 10.2 MAN HOURS

The initial estimate for complete dismantlement of Eurochemic called for 403 man years. The current estimate is 600 man years. This substantial difference can be explained by the fact that extensive decontamination was chosen, fundamental deviations were found from the initial inventory, and additional, labour-intensive pre-release measurements were taken.

### 10.3 FINANCES

The most important message with respect to finances is that the overall cost of the dismantling virtually remained unchanged throughout the years (175 million euros). In terms of itemization, the item "dismantling expenses" almost doubled due to extensive decontamination of material before release. In contrast, radioactive waste processing, temporary storage and continuing storage to this day are barely one third of the original estimate. The explanation lies in the labour-intensive release (= man hours), which resulted in a much smaller quantity of conditioned waste to be stored...

### 10.4 PLANNING

Today, June 20, is the official kick-off date for the actual demolition of Eurochemic. This demolition will be concluded in three stages. For this purpose, the building has been divided into three sections. An eastern, a central, and a western section. The eastern section will have been demolished by the end of September 2008. The central section by the end of 2009, and the western section in 2012. Condition 'Green Field' will be reached in 2013.

Please note that the section of the building that serves for distribution of water and electricity for other buildings will remain in existence.

## 11 CONCLUSION

**Belgoprocess and NIRAS successfully decommission a nuclear plant (the former reprocessing plant Eurochemic).**

**The official demolition kick-off takes place on 20 June 2008.**

**By 2012, Eurochemic will have been completely demolished.**

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### 12 WHAT VISION GUIDES BELGOPROCESS OPERATIONS?

Belgoprocess aims at performing all of its activities while guaranteeing the safety of employees and the population, while protecting the environment, and reducing harmful consequences of these activities to a level as low as reasonably possible.

The activities are executed in compliance with the standards, laws, and permits imposed by the relevant government authority and policy requirements of Belgoprocess. Belgoprocess executes these activities according to the strategy formulated by NIRAS and in consideration of the limited available resources.

These activities relate to each phase of radioactive waste processing and storage, of dismantling and decontamination, and all other services.

As one of the ways to achieve this objective, Belgoprocess has implemented a solid and integrated Quality, Safety, and Environmental Policy.

The main objectives of this policy are:

- To obtain and maintain a sufficient level of quality in the services delivered, in compliance with criteria imposed by the client and the company's internal management structures
- To create a safe and healthy work environment for both nuclear and conventional aspects of all work activities. This is accomplished by multiple subsequent measures to be defined after analysis of the work environment. If possible, risks are avoided. If not, risks are reduced. Next, collective protection measures take priority over personal protection measures and, finally, risky situations are flagged and employees are trained to safely execute their tasks. Belgoprocess strives to keep the number of work-related accidents and the accumulated radiation doses as low as reasonably possible
- To minimize the environmental impact of its activities on the surrounding areas. By using an Environmental Monitoring Programme, Belgoprocess shows that the impact on the environment is monitored and that this impact is negligible. Release of polluting materials into open water and emissions into the air are reduced as much as possible. Further, Belgoprocess strives to create as little waste material as possible. When creation of waste material cannot be avoided the company strives to recycle it as much as possible.

While executing its activities, Belgoprocess is open to communication with all stakeholders. The environment receives constant attention from the organization's employees. Maintaining open and clear dialogue with residents in the area, local governments, and other stakeholders constitutes an essential part of the operations of Belgoprocess

- To instil trust among internal management structures and stakeholders

The company strives for continuous improvement in terms of quality, safety, and the environment through "best practices" management, in addition to active involvement of all employees.

To implement this policy Belgoprocess applies a modified quality assurance system consisting of its organizational structure, responsibilities, process descriptions, processes and resources. The quality assurance system complies with the international standards ISO-9001, ISO-14001 and OHSAS-18001.

By signing this Declaration, the Board of Belgoprocess acknowledges to do everything in its power to maintain the quality assurance system as described in the handbook and to review its results on a regular basis.

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### 13 CONCLUSION

Waste is processed in a safe and quality and environment-friendly manner and temporarily stored awaiting permanent storage.

This completes the life cycle from the moment of waste generation, processing and conditioning, to temporary storage, to the moment of permanent storage (above or underground). The company has at its disposal technical resources (processes and installations), verification resources (FANC – federal agency for nuclear verification), strategies and policies (NIRAS), as well as structured financial solutions (contracts with producers).

In summary: there is now a structured solution for management of radioactive waste in which Belgoprocess plays an important part. This solution is safe, ensures quality, and protects the environment.

### 14 BELGOPROCESS – COMPANY PROFILE

The Belgoprocess corporation was established in 1984 and is headquartered in Dessel, Belgium. Since 1986, Belgoprocess has been a subsidiary of NIRAS, the Belgian agency for radioactive waste and enriched fissile materials. Parent company NIRAS was established by law (8 August 1980) and by Royal Decree (30 March 1981). Belgoprocess is charged by NIRAS to process radioactive waste produced in Belgium that is not processed by producers themselves. Additionally, all conditioned waste is temporarily stored by Belgoprocess awaiting permanent storage. Further, Belgoprocess provides services to other clients in Belgium and abroad. Belgoprocess currently fields a team of some 248 employees. A fairly small country with a substantial nuclear programme, Belgium opted for centralized processing and management of radioactive waste. This approach ensures uniformity in management and policy, undoubtedly enhancing quality control and verification.

#### 14.1 CORPORATE SOCIAL RESPONSIBILITY

Today, more than half of all Belgian electricity is generated with nuclear energy. Additionally, radioactivity plays an important role in health care and in industrial and scientific applications. All these activities result in residual quantities of radioactive waste materials requiring special care. As a final link in the production and recycling chain, Belgoprocess ensures that this radioactive waste is processed and stored in such a way that the risks of harmful effects for humans and the environment are minimal. Specifically this means that choices are made that guarantee safe management of radioactive waste and with an eye toward cost control. Only by achieving both objectives, safe management and cost control, can the public interest be respected and can expectations from that same public be met. Radioactive waste is processed and managed in an ecologically and economically responsible manner. For this purpose, calculations are made regarding the costs of processing and managing today and into the future. These cost calculations enable Belgoprocess to charge the correct amount to waste producers. These producers themselves bear the costs for processing and for later storage of the radioactive waste they produce. For processing radioactive waste from the past and for dismantling obsolete installations, the power grid operator charges a fee on electricity (kWh) used in Belgium. These financial resources are deposited into a fund managed by NIRAS. Providing objective and transparent information about radioactive waste management in Belgium and about the relevant role of Belgoprocess is a crucial and obvious part of the societal task to be fulfilled by Belgoprocess.



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### 14.2 CLIENT ROSTER

With the exception of a limited number of services to other clients, the Belgian client roster of Belgoprocess is founded on contracts with NIRAS. These contracts with NIRAS represent 96% of revenues. Almost half the financial scope of the contracts with NIRAS relates to management of installations. Another part of orders to NIRAS consists of assignments for dismantling and decontamination, additionally studies and projects, and tasks related to waste management. The remaining 4% consists of various other domestic assignments and foreign contracts for consultancy. This development of knowledge and resources is limited but strategically important for the long-term success of the organization. Initiation of foreign waste treatment in Belgium adds a new dimension to this strategy of sustainable development.

### 14.3 SUMMARY OF ACTIVITIES

The choice of centralized processing and management ensures that all radioactive waste produced in Belgium eventually ends up at Belgoprocess. Radioactive waste material originates at nuclear power plants, hospitals, and industry labs. The purpose of processing these waste materials is to protect humans and the environment now and into the future from the possibly harmful effects of radioactivity. To attain this objective, Belgoprocess converts the raw and heterogeneous waste into a compact and chemically stable end product using a series of processing and conditioning processes. Protection of the environment is guaranteed through compliance with federal and regional permits based on stringent, international radiological and environmental standards. To this end, Belgoprocess uses the most advanced technologies and installations. These installations are located in the cities of Dessel and Mol. Processed and conditioned waste material is temporarily stored above ground while waiting for exploitation of a permanent storage site. Current activities by Belgoprocess can be divided into two core areas. First, there is processing, conditioning, and temporary storage of radioactive waste. Additionally, Belgoprocess provides services for dismantling obsolete nuclear installations.

### 14.4 SAFE PROCESSING AND STORAGE

Radioactive waste materials are stored at the source according to regulations from NIRAS. The treatment to be applied is determined by the physical and chemical characteristics of the material. After sorting, the volume of solid waste is reduced by burning or compressing the waste material. All wastewater is collected in tanks and reduced to a small volume of sludge through chemical or thermal treatment. Afterwards, the residual material of the waste is encapsulated in cement or bitumen, formerly also in glass, and packaged in steel drums. These drums are temporarily stored in concrete structures which protect against radiation. Later these drums will be permanently stored in an area where eventually the radioactivity will die out.

Belgoprocess is regularly in the news when a new transport carrying vitrified waste arrives at the site. These transports contain the vitrified residue of Belgian fissile elements that were sent to France for recycling (reprocessing) and that are being accepted into storage by Belgoprocess.

### 14.5 DISMANTLING INSTALLATIONS

Obsolete nuclear facilities must be decontaminated and demolished in a safe and responsible manner. This means that all radioactive materials must be removed. If necessary, concrete walls are carefully shaved. The goal for Belgoprocess during dismantling is to reduce the radioactive material to the smallest possible volume of radioactive waste and then subsequently to recycle the major parts of the decontaminated buildings and installations as non-radioactive material. Once buildings have been cleared of radioactivity, they can be demolished. Belgoprocess is dismantling the installations of the former Eurochemic reprocessing plant in a safe and responsible manner. Eurochemic was the first civilian plant in Europe to reprocess radiated nuclear fuel. Operations at the plant

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were discontinued in 1974. In addition to the Eurochemic installations, Belgoprocess is also dismantling other obsolete installations primarily located at the company's own Belgoprocess site in Mol and Dessel.

### 14.6 STORAGE PLANS

The third core activity of Belgoprocess, i.e. operating its own storage sites, so far remains in the future. In these early stages, as a nuclear operator, Belgoprocess already has the appropriate organizational structure and the required competencies to expand its activities to also include the operation of storage sites. Such sites are intended to permanently separate radioactive waste from the biosphere so that radioactive waste no longer represents a burden on future generations. Belgoprocess has included these plans in its mission and assignment statements. The political decision for permanent storage of conditioned, short-lived, low and middle-active waste has already been made. Belgoprocess has participated in this debate as an involved party.

### 14.7 MISSION

Belgoprocess constitutes a crucial link in the nuclear industry. We wish to concentrate our activities on three aspects: treatment, conditioning and temporary storage of radioactive waste, dismantling of obsolete nuclear installations and dismantling of contaminated buildings and sites, and operating storage sites for conditioned radioactive waste. Belgoprocess intends to be active in both domestic and international markets.

It is our mission to perform these activities in a professional manner and in consideration of the interests of our customers, the interests of our employees, the interests of our shareholders, and in consideration of the political context, with an eye towards safety, and the ecological and social environments.

We contribute to the social and economic development of the region as an example to all of Europe. By developing, expanding, and applying environmental technology as a crucial link in the achievement of our long-term strategic objectives we wish to be an example for the safe and responsible treatment of radioactive waste. This voluntaristic policy contributes to a responsible restriction of the ecological impact of nuclear energy use.

In accomplishing this mission, our employees play a crucial role. It is through their collective effort with attention for values that we wish to achieve our goals. That is why we are proud to be Belgoprocess.

### 14.8 NUCLEAR COMPANIES IN THE REGION

In addition to Belgoprocess, there are five other nuclear companies located in the region (FBFC International, IRMM, SCK\*CEN, Tecnobel, and Transnubel). Belgonucleaire has decommissioned its production installation. In total, the nuclear industry provides approximately 2,000 jobs in the Campines region.

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### 14.9 BELGOPROCESS – FACTS AND FIGURES

#### BELGOPROCESS NV

*Crucial link in the nuclear industry*

<b>Industry Field:</b>	Radioactive waste
<b>Name:</b>	BELGOPROCESS
<b>Address:</b>	Gravenstraat 73, 2480 Dessel, Belgium
<b>Phone:</b>	+32 (14) 33 41 11
<b>Fax:</b>	+32 (14) 31 30 12
<b>E-mail:</b>	info@belgoprocess.be
<b>Legal form:</b>	public limited company
<b>Creation:</b>	Established on 29 November 1984. Published in the Belgian Bulletin of Acts, Orders and Decrees of 12 December 1984 under No. 3417-8
<b>General Manager:</b>	René Gilis
<b>Personnel Roster:</b>	248 employees
<b>Initial Capital:</b>	5.000.000 €
<b>2007 Revenues:</b>	39.804.000 €
<b>Parent Company:</b>	NIRAS, Kunstlaan 14, 1210 Brussels, Belgium
<b>Clients:</b>	Producers or holders of radioactive waste.
<b>Activities:</b>	Belgoprocess focuses on three core areas: <ol style="list-style-type: none"><li>1. treatment, conditioning, and temporary storage of radioactive waste</li><li>2. dismantling of obsolete nuclear installations and decontaminating contaminated buildings and sites</li><li>3. operating storage sites for conditioned radioactive waste.</li></ol>
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