Historical series

September 2019

MUSÉE DU PLÂTRE

The Cormeilles Quarry Since 2007

The final years of open-cast mining

Cormeilles is located some 15 km northwest of Paris. The open-cast mine (the quarry) cuts into the low hill ("la butte") above the old town centre; the production plant lies just below the hill, and the cement plant (closed 2000) was a further 2.5 km away, on the banks of the River Seine.

The following article was published in 2007, when the quarry was still operating with a pit depth of 100 metres and restoration efforts were underway. *(A decade later, open-cast extraction has been discontinued, and roughly half of the pit has been filled, revegetated and opened to the public; wild orchids have returned; and gypsum extraction is continuing with underground mining.)*

The quarry in 2003. After cessation of cement production, only the gypsum was removed; all other material was used to backfill the pit. The cutting face had reached the northern limit of the hill, and shifted to the west. Photo Musée du Plâtre.

The present and future of the Cormeilles quarry (2007)

Open-pit extraction from the gypsum quarry in Cormeilles-en-Parisis will soon draw to a close. The site will not be abandoned; it is currently being backfilled with inert materials and landscaping has begun. Once the open-pit operations are completed, however, up to ten million tonnes of gypsum will remain underground. We discuss the possible transition from open-cast to underground mining.

For over twenty years, the Cormeilles quarry has been worked according to a precise mining and restoration plan. The plan requires the operator to backfill the huge excavation resulting from open-cast mining, and the gradual reduction in the land that can be cleared for access to the gypsum needed for the factory, which produces plasters and blocks.

Given annual production needs and existing planning consent, open-cast operations will have to be discontinued around 2015 or 2016.

Gypsum deposits and use

The plant uses about 45,0000 tonnes of gypsum every year; all comes from the local quarry. The gypsum is found in three seams separated by marls. The three gypsum seams (counting from the top) are approximately 16 m, 6 m, and 2.50 m thick; the 1st seam produces about 320,000 tonnes of highest-quality gypsum a year, while the 2nd and 3rd seams together yield about 130,000 tonnes of slightly lower purity gypsum.

The highest-purity gypsum from the 1st seam is used mainly for a range of industrial and molding plasters (high-quality plaster of Paris), and related products produced by mixing with additives in the Special Products section of the plant.

Gypsum from the 2nd and 3rd seams is used exclusively for prefabricated plaster products (by outside customers and in the Gypsum Block section of the plant).

Geological formations and history of open cast production

Open-cast mining in Cormeilles began nearly two centuries ago; it has adopted—and often driven—technological progress.

The clear horizontal separations between geological strata meant that benches—horizontal steps across the cutting face—could be used to extract and carry each material by rail. There were 12 benches in 1939, across a cutting face 80 metres high.

To summarize, the principal materials were: topsoil and sand, "pierre meulière" (a type of chert used locally for building stones) and limestones, clays, muds and marls, and the different strata of gypsum. (Whatever material from the overburden could not be sold was used to backfill the worked-out areas.)

- The sand, because of its clay content, was of little commercial value, and only a small portion was used for embankments or road works.

- The "pierre meulière" and limestone were used as building materials.

- Clays were used to make bricks, chimney pots and related ceramics. Cormeilles produced chimney pots in the first half of the twentieth century.

- The marls were used by the Cormeilles cement plant on the river Seine (1931-2000).

- And the gypsum, of course, was the reason for opening of the quarry. Lambert operations began in 1832 and continue to the present day).

Operations in 2007

Today, in 2007, commercial production is largely limited to gypsum. Still, each year, some 40,000 tonnes of sand are sold for road construction, and a few thousand tonnes of "green clay" are sold for impermeable basement sealing and covering for landfill sites.

To extract the 450,000 tonnes a year of gypsum, or roughly 220,000 cubic metres, we move roughly 1.1 million cubic metres of overburden (with a peak of 1.5 million cubic meters), made up of the materials mentioned earlier, and most of which is used to backfill and restore the Cormeilles hill to the same condition as two centuries ago.

British Plaster Board , which acquired the Lambert plaster business in 1990, contracted overburden removal to Charier, an earth moving contractor. BPB extracted the gypsum, which is now done with limited equipment. A rotary drill to prepare blast holes, a scaling machine to knock down unstable blocks from the cutting face after blasting, and a front wheel loader to feed the mobile crushing machine that follows the face and feeds the factory via belt conveyors that run to the storage area.

Backfilling, which began roughly 25 years ago with 200,000 cubic metres a year of inert material trucked in from outside the quarry, accelerated rapidly to 700,000 cubic metres a year, but had to stop in 1995 to prevent the pit from filling too fast. Currently, it is claimed that the overburden (which becomes less compact when redeposited) is enough to fill at the appropriate rate. The current arrangement is thus valid through the year 2016, when operations will reach the limit of the areas accessible to open-pit extraction. But the hill will still hold tens of millions of tonnes of gypsum. (*But no more than ten million could be accessible by underground mining –added 2019)* And the resources in other parts of France are not unlimited.

Underground extraction in Cormeilles?

To recover the valuable gypsum, there is only one solution: underground mining. This has at least two advantages. There is no visual impact on the surrounding landscape, and it doesn't require moving 5 or 6 cubic metres of material to extract 1 cubic metre of gypsum. But underground mining is more challenging and requires special equipment. More importantly, it can recover only about a third of the gypsum that would be extracted with surface mining. The two lower seams, i.e., the 2nd and 3rd seams, or one-third of the resource, could not be extracted. *(This is because the interburden between the 1st and 2nd seams, and between the 2nd and 3rd seams is not thick enough, and the rock is plastic.—added 2019)* Extraction of the top seam would require leaving nearly half the gypsum, in the form of pillars, a roof beam, and a floor beam. Only 30 to 35 percent of the gypsum could be removed, but there would be no alternative. This would extend the life of the mine by over 20 years and would continue to supply the Cormeilles plant.

The big question is obviously to validate the method in the Cormeilles formation. Some 40 or 50 years ago, it was often claimed that the gypsum in Cormeilles was too soft for extraction by underground mining. At the time of writing (2007) there is no scientific information available. *(Added 2019: Underground extraction is well underway.)*

Accordingly, in close cooperation with the Regional Agency for Green Spaces (the public authority that owns the land), Placoplatre is conducting a drilling campaign, with analyses and mechanical tests to determine, most importantly, the compressive strength of the gypsum in Cormeilles, compared to other gypsum being extracted by underground mining (e.g., the neighboring mine in Montmorency).

All these tests should be completed in 2008. If the results are satisfactory, that would leave about seven years before 2015 to prepare roads, equipment and the organization needed to begin underground extraction—away from residential areas—and thus maintain operations in Cormeilles for at least twenty more years. *(The most important and difficult aspect of the process was preparing the application for planning consent.—added 2019)* This would be done safely, with mandatory controlled backfilling after completing operations, in the same way as in the mines at Livry-Gargan and Montmorency.

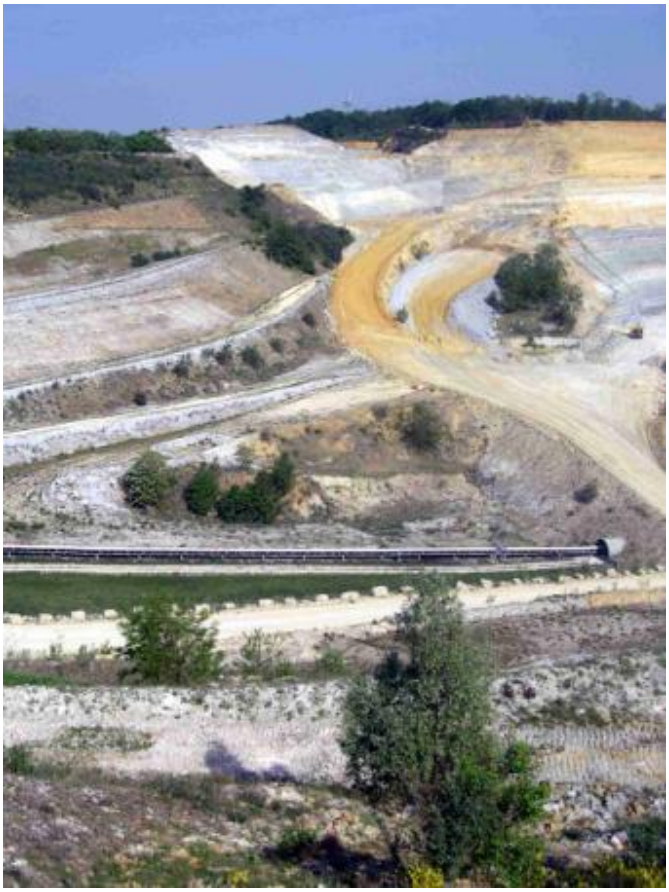
Thanks to Albert Armangué, head of the Gypsum Department at Placoplatre (a Saint-Gobain Group company) for welcoming us for an interview on 30 April 2007.

Article by Jean Fenou, published in 2007

The Lambert quarry in 1900. A large portion of the hill (the "butte") has already been removed; the benches are visible as are the differences between the gypsum and other seams. Industrial processes had been introduced some twenty years earlier by Hilaire Lambert. Postcard from Musée du Plâtre collection.

The Lambert quarry in the 1950s. Mechanisation accelerates production. Benches mark the separations between the various geological strata. Narrow-gauge diesel locomotives and wagons run on the tracks laid on each bench, under each cutting face. Musée du Plâtre collection.

Gypsum extraction, the gypsum face and the in-pit crusher. After blasting, the gypsum is crushed by an in-pit crusher and then transported by a belt conveyor to the plaster works. Photo Musée du Plâtre, 2007.



Cormeilles quarry. The boundary between the working pit (above in photo) and areas (on higher ground) already backfilled and landscaped. Photo Musée du Plâtre, 2007.

Part of the site in process of being landscaped (seeded with grasses or planted with trees). The area is being opened to the public in stages. Photo Musée du Plâtre, 2007.