Leitha Limestone of eastern Austria
a mineral resource for high quality filler, cement, and dimension stone

This poster summarizes the paper: Neogene pumice limestones in eastern Austria for multiple applications

Introduction
Providing mining-archives and data collections, and the search for mineral commodities on Austrian territory are among the main tasks of the Department of Mineral Raw Materials at the Geological Survey Austria. Hereina research about distribution, availability as well as lithological/geological and further characteristics are included and used as a contribution to assess mineral raw materials. This poster focuses on a selected lithofacies unit and exhibits in general the current status of knowledge of the Leitha Limestone. Furthermore, their great importance for historic architecture, masonry constructions and sculptures is pointed out.

Geological setting, distribution, lithological and mineral commodity parameter of Leitha Limestone s.l.
Leitha Limestone sequences consist of calcarenitically cemented and sandy whitish or light brown strata which are characteristically composed of the rock building coralline red algae, foraminifers, crinoids,particle or chert nodules, that developed, besides other places, around the Znojmo Mountains. As shown in the geological map of Austria, the Leitha Limestone is present in the Vienna basin and parts of the Burgenland and Styria region. Biostratigraphic carbonates composed of coralline algae are widespread in the Cenozoic record up to present and nead shallow marine environments. Growth-rolling algae platforms are known from some Mediterranean and Red Sea coasts for example. In addition, fine sandy-granules composed of undifferentiated algae, bryozoans and mollusc species, known as mafell, accumulated also on temperate shelves, e.g. of the European Atlas. Like today, the atoll environment of high platforms in the Indian Ocean bordered spatially by shallows, shallow marine shelves, tropical climate and protection against terrestrial influx. The faunal spectrum of Leitha Limestone includes, besides its usual bryozoan specie, coralline algae, with common forms like coralline algae, the Serpulina and some species of clams, parts, called ‘dedritale Leitha Limestone’, consist mainly of the reworked and edoped reiposition of the last few million years. Distinctive Germanic development are further sedimentary, but they stand today in lithostratigraphy. The diagenesis of Leitha Limestone lead to overwhelming calcitic, porous, either cemented or sandy rocks, with minor skeletal skeletal carbonates and with up to a certain characteristic of mean texture. The original argonitic parts are eroded during the latest Pleistocene.

Averaged chemistry shows immediately to highly pure pumicites. With regard to the Austrian Limes on Raw Mineral Raw Materials they are grouped in the “Fine for mining mineral raw materials”, which requires a minimum of 95% calcium carbonate. Their whiteness properties are variable. The waters of the most whitish occurring ones, like those on the stretch between the Danube and the Mariazell mountains, do exceed the specifications of 85% (St. Stephen’s Cathedral and Maria am Gestade (restoration works), New Main Hall, National Bank of Austria, Dominikaner, Franziskaner, St. Ottmar and other churches, parts of Schottenkirche, with skulpture, buildings, Wieener Musikverein, Palace of Justice, and the new facades of Vienna University. Fifty percent from the current production is dedicated to restoration works. A part of the large quarry area is graded as scenery for open air theatre, and an on-site museum on sculpture art takes attraction.

Applications of Leitha Limestone based on active quarries
Ground carbonate basement
In no other occurrence does Leitha Limestone appear in comparable quantities as in this thick, unconsolidated deposit. This highly diversified and especially cemented in the northern Europe, its examined pumice was yet the same: chalk. The quarry and factory have been in existence for over 150 years. Through nearly 100 years, the site was also worked for building materials, and an intensive mining production was going on. The quarry area, in which the material is now excavated by ramp, is about 650 m long and 200 m wide; however, partly reclaimed. The product range changed according to demands: the material is nowadays ground, processed to pumice pebbles, or processed pebbles, which are used in the ground Trion, the averages of grain size range from 8 to 10 mm, and some of them are surface treated. The most ground Trion GT is already 80% fine ground, say 25% of 63 microns. Today, it is used in the rubber, paint and plastic industries. Very recent, geological investigations (WIEDL, et al., in press 2006, 31 details) composed of 125 m or 70 mm, and it is used in the building industry and for the northern spas of the coal and the rubber industry. This quarry is situated only 2 km northwest of the Bruck an der Leitha, the pharmacy of Eggendorf/Grottkau, which was quarried for lime burning.

Cement
Both large-surface mines for cement production, which are based on Leitha Limestone, are owned by Lafarge company. Likewise the former owner of both was the Petschinger Gemischtwerke AG, and both commenced at the end of the 19th century. The location of the place Märkurdorf (C), situated near the north-wis east slope of the Leitha Massif, has been intensively interconnected to stone manufacturing. Building and ornamental stone were delivered to Vienna notably in the 19th century. At the beginning of the 20th century, the quartzite of the Leitha was used in Vienna from 1803 to 1972, and which is now reclaimed as museum. In the main museum of the monastery, the department for working of Leitha Limestone is the main processing of the Leitha Limestone.
The Leitha Limestone quarries are 2 km, of which 80% comprises reclaimed area. The active part is still about 800 m long and 250 m wide. Quarry operations are carried out by drilling and blasting. The material is transported to the plant via road and rail and processed by crushing and screening. Various cement types are produced (product data sheets are online). According to geological investigations by WIEDL, et al. (2012), the 50 mm thick assembled sequence has the same age as the one in Müllendorf quarry. However, the palaeoclimatic conditions was partly deeper (same value) due to erosive processes, during which slightly different coralline limestone areas, often with mafell and molluscs, but without corals, are characteristic. The deposit is a primary deposit which is of the other hand not developed in the Styrian basin and developed in the Middle Styrian Swell. The nearby conglomerate is in Retten in Retten (F). Both cement plants, Retteni and Marienfeld, are therefore based on the same Leitha Limestone. Leitha Limestone contains various mineral as addition, the process of lime and cement started in the middle of the 19th century, and with further industrialisation and takeover of Petschinger, only the cement production was expanded. A quarry section reached a huge area and was used as raw material for lime and marble has been transported by both conveyors. The older western part covered about 1.5 km2, the eastern, still active part, about a third of the other area. The Leitha Limestone succession more recently has undergone different compositions, in which abundant coral patch reefs and larger rhodoliths occur; less and more variable thicknesses with facies transitions to algaliclastic near- and offshore environments (REUTER, et al., 2013). Above it, the Stephanian Basin the Leitha Limestone developed in the Middle Burgenland and was formed mostly in a platform area. The time terms of the Stephanian have formed the southern part of the Leitha Limestone. At the northwestern, the distant middle of the eastern part of Austria, of Alfes located within the same carbonate sequence. A second section of the Leitha Limestone is situated in the Steindorf area of Leitha Limestone, near Weßling (E), about 20 km to the NW, from where similar, partly marble limestone is caved by tracks to Retteni.

Building and ornamental stone
Leitha Limestone is an exposed building and sculpture stone and was widely used and distributed. It shaped the image of the villages in the nearby counties, and is the prominent stone of Vienna, Graz, the neighbouring parts of Hungary, Slovakia, Czech Republic, etc., according to its favourable use in certain parts of geological (Graz, Blaue, Ringstrasse in 1877 - 1977). It was efficiently substituted with time, yet serves for prestige building up to present. It was exploited in certain quarry districts, of which each experienced its individual history. Apart from the above-mentioned, the sites are abundant or reclaimed.

Gustav Hauser Company produces the St. Margarethen detrital limestone from Römerbrücke Steinbruch. Margarethenhügel (A). Here, the Leitha Limestone epibionts at least a thickness of thirty meters, is of Middle to Upper Badenian age, and has a characteristic yellow, brown, light brown, stratified appearance, made up predominantly of well sorted tiglium detritus and sometimes intercalated layers of mudstones. It is a famous geological and biological reference point. Examples of well this stone was used in Vienna, St. Stephen’s Cathedral and Maria am Gestade (restoration works), New Main Hall, National Bank of Austria, Dominikaner, Franziskaner, St. Ottmar and other churches, parts of Schottenkirche, with sculpture, buildings, Wiener Musikverein, Palace of Justice, and the new facades of Vienna University. Fifty percent from the current production is dedicated to restoration works. A part of the large quarry area is graded as scenery for open air theatre, and an on-site museum on sculpture art takes attraction.

Underground quarry, Römerbrücke Alfes (B), already mentioned with Retten, is known since Roman Times. Mining and mining activity occurred during the Middle Ages and Ringstrasse era, but ceased in the 20th century. It is operated periodically by Steier von Gries. The underground chambers are also used for a variety of public events. During the World War I, a large number of constructions camps build a war factory. The underground quarry extends over a length of 100 m and a width of 200 m, with heights of between 6 m and 8 m (although the limestone horizon is 40 m thick). It has been almost completely excavated, with only large pillars remaining to maintain the stability of the workings. The Leitha Limestone consists of a light beige fine-grained algal-debris facies, is bottony cemented, very porous, and easy to work in moist state. Examples from the region are the Great Church of Vienna and churches, court and clock tower opera house, universities, but also from restoration works (St. Stephen’s Cathedral in Vienna).

Future research
Quarries provide valuable outcomes for studying the various sequences according to facies relationships and other characteristics. One of the nearer targets is the compilation of former geological studies in updated terms of sequence stratigraphy for local and regional comparisons accompanied by facies studies. A further target is the establishment of facies types of Leitha Limestone. I. fitted into time and space, within given limits of facies varieties. This was put forward by previous scientists, like E. KIESSLINGER, but should be updated. It will be aimed not only of identifying the stones of historic and ancient objects but moreover, if possible, at locating their provenance. Essential quarry areas forrestensive purposes could then be identified, and the cultural aspects of this stone highlighted.